

REPORT OF THE
NATIONAL COMMISSION ON AGRICULTURE

1976

PART XIV
PLANNING, STATISTICS AND ADMINISTRATION

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GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE AND IRRIGATION
NEW DELHI

P R E F A C E

The Report of the National Commission on Agriculture comprises 69 chapters in 15 parts. A complete list of chapters and parts is given in pages (ii) and (iii). The Terms of Reference of the Commission and its composition are given in Part I - Chapter 1 - Introduction.

This volume entitled 'Planning, Statistics and Administration' is Part XIV of the Report and is divided into the following five chapters

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- 61. Statistics
- 62. Administration
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- 64. International Cooperation

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NATIONAL COMMISSION ON AGRICULTURE

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PLANNING

PLANNING**1 INTRODUCTION**

60.1.1 Among the developing countries, India is a pioneer in planning for economic and social development. As early as 1938 planning was recognised as a powerful instrument for economic and social change by the Indian National Congress. Soon after Independence the National Government adopted economic planning as a principal policy for development of the national economy. The country has already implemented four five year plans and three annual plans. The Fifth Five Year Plan is being implemented since April 1974. Agriculture along with irrigation and infrastructure have received priority in all the plans, though there were shifts in emphasis as between agriculture and other sectors of the economy in the overall scheme of development. Due to the pragmatic approach in Indian planning it has been possible to make the necessary changes in priorities and policies from time to time and from plan to plan. This has imparted to the development process the desired flexibility.

60.1.2 The experience of planning in the field of agriculture during the last twenty five years, however, suggests some urgent and essential organisational and directional changes in the planning process and a reorientation in the outlook of the planning machinery at different levels. Examination of these issues is the primary concern in this chapter. Besides presenting

a brief account of the genesis of Indian planning, the organisational set up and the process of plan formulation and implementation, the chapter focuses attention on the need for a new approach to agricultural planning. Developing from the level of villages, plans should concretise in the form of projects/programmes and inter-sectoral coordination in the different watersheds and agro-climatic regions and get integrated at the State level within the framework of the national plan. Such an approach facilitates not only fuller development and utilisation of local resources but also the involvement of various sections of the community. The district emerges as the crucial unit of planning for agricultural production at the operational level. It needs to be provided with an adequate machinery for plan formulation and implementation. Agricultural planning in our view should be an instrument not only for maximising production but also for promoting balanced regional growth and spreading the benefits of development particularly among the weaker sections of the community. Towards this end the requisite infrastructure and institutional support has to be provided.

2 HISTORICAL BACKGROUND

60.2.1 The first effort at economic planning in India was non-official in nature. The National Planning Committee was appointed in 1938 by the Indian National Congress. Official efforts began in this direction in 1943 when a Reconstruction Committee of Council was constituted with the Viceroy as President. The Second Report on Reconstruction Planning (1944) by this Committee was in the nature of a preliminary economic plan covering all major sectors of the economy. In 1944 Government of India created the Department of Planning and Development for coordinating the plans prepared by various departments of the Central and Provincial Governments and Princely States. Immediately after assumption of office by the Interim Government in September 1946, it appointed an Advisory Planning Board to examine and review the major problems of post-war reconstruction.

Planning Commission

60.2.2 After Independence the Planning Commission was set up in March, 1950. The major functions assigned to it were:

- i) to make an assessment of the material, capital and human resources of the country and investigate the possibilities of augmenting such of these resources as are found to be deficient in relation to the nation's requirement;
- ii) to formulate a plan for the most effective and balanced utilisation of national resources;
- iii) to determine priorities, define the stages in which the plan should be carried out and propose allocation of resources; and
- iv) to appraise, from time to time, the progress achieved in the execution of the plan and recommend suitable adjustments of policy and programmes.

60.2.3 The Resolution setting up the Planning Commission stated that planning was intended "to promote a rapid rise in the standard of living of the people by efficient exploitation of the resources of the country, increasing production and offering opportunities to all for employment in the service of the community". Being committed to the welfare of all sections of the community and to the objectives of equality of opportunity for all, India's Plans serve as instruments for achieving the ultimate goal of "socialistic pattern of society". Planning in the country, in fact, derives its relevance and sanction from the 'Directive Principles of State Policy', laid down in the Constitution.

60.2.4 Each Plan puts forth a scheme of investment alongwith a policy frame including institutional changes designed to achieve specified objectives both overall and sectoral. Policies and programmes for agricultural development have been an integral part of the overall plan-frame. The major objectives of agricultural development under the successive five year plans have been:-

- i) achieving self-sufficiency in foodgrains;
- ii) increasing agricultural production to meet the needs of industry and exports;
- iii) diversifying the rural economy with stress on animal husbandry, dairying and fisheries; and
- iv) improving the levels of living of the farm community which constitutes the bulk of the population.

Agricultural Production Policies

60.2.5 The policy adopted in crop production in the early stages was to organise the effort on as wide an area as possible. The Grow More Food Campaign (GMF) launched in 1942

was the first major effort for increasing agricultural production. The emphasis under the Campaign was on schemes designed to increase the area under foodgrains; both by extension of cultivation to fallow and cultivable waste lands and by diversion of area from cash crops to food crops. Schemes for increasing the yield per hectare by way of provision of irrigation facilities and popularisation of the use of manures, fertilisers, improved seeds etc. were also sanctioned by the Central Government.

60.2.6 The strategy of agricultural development adopted under the First and **second** Five Year Plans was broadly in terms of extension of area under cultivation and increase in yields through larger use of improved inputs. Stress was laid on general programmes of development, such as creation of additional facilities for irrigation, soil conservation, land reclamation and development and measures to increase supply of material inputs like fertilisers, seeds etc. Model schemes such as "Seed Multiplication Farms" were prepared and sent to States for adoption. Financial assistance was given to States on a schemewise basis. Reliance was placed on the programmes of Community Development and National Extension Service to achieve rural development through people's participation and initiative. It was envisaged that these programmes would bring about a qualitative improvement in all fields of agricultural development particularly crop production.

60.2.7 A significant shift from the extensive approach was made in 1960-61 when the Intensive Agricultural District Programme (IADP) was taken up in a few selected districts.

Under this programme simultaneous attention was given to the use of package of inputs namely quality seeds, adequate dose of fertilisers and plant protection measures. The arrangements for extension effort as also for supplies of inputs and credit were strengthened. Subsequently in 1964 the package approach adopted under the IADP was extended to a larger area under a slightly modified and extended version of the IADP called the Intensive Agricultural Areas Programme (IAAP). While both these programmes followed the same basic approach to crop production, in the IADP districts staffing was more intensive, credit and marketing received greater attention and package of improved practices was recommended for all important crops. Under IAAP, importance was attached to increasing production of major foodgrains only.

60.2.8 To meet the situation caused by the severe droughts of 1965 and 1966 a new strategy for agricultural development was evolved and put into operation in 1966-67. Greater emphasis was laid on increased application of science and technology for raising agricultural productivity. The new strategy involved a substantial step up in the expenditure by farmers on improved cultural practices. It envisaged a considerable expansion of institutional credit for financing schemes of minor irrigation including ground water development and land improvement. Keeping in view the varying impact of development schemes on different sections of the society and on different regions, the Government introduced special schemes for the benefit of weaker sections and backward areas. Important among them were the Projects for setting up Small Farmers' Development Agencies (SFDA), Marginal Farmers and Agricultural Labourers' Agencies (MFAL) and programmes for development of drought prone and dry land farming areas.

60.2.9 The Fourth Plan set forth two other important objectives: (a) to provide the conditions necessary for a sustained rate of growth of about 5 per cent over the next decade; and (b) to enable as large a section of the rural population as possible to participate in development and share its benefits. Accordingly, the priority programmes of development in the crop husbandry sector in the Fourth Five Year Plan were broadly categorised into: (a) those which aim at maximising production; and (b) those which aim at remedying imbalances. Removal of poverty and attainment of economic self-reliance are the two strategic goals that the country has set before itself and the development perspective covering the period 1974-75 to 1985-86 envisaged under the Fifth Plan formulations has been conceived in that light.

60.2.10 In the sphere of animal husbandry, systematic efforts for development of livestock may be deemed to have started with the initiation of the Key Village Scheme involving simultaneous attention to breeding, feeding and disease control in the First Five Year Plan. A comprehensive scheme called "Intensive Cattle Development Project (ICDP)" was taken up in milkshed areas of major dairy plants in 1964-65, each project covering a population of one lakh **breedable** cows/buffaloes. The approach adopted under this scheme is similar to that adopted under the package programme approach for crop production and involved simultaneous attention to different aspects of cattle development. An all-India Coordinated Research Project on Cattle Breeding and Buffalo Breeding were initiated in the Fourth Five Year Plan. Genetic improvement of livestock, feed and fodder development, development of marketing facilities ~~and~~

and provision of adequate health cover are the principal features of development schemes taken up in the animal husbandry sector. In the field of animal diseases, the outstanding feature of planning was initiation of the rinderpest eradication scheme during the First Plan.

60.2.11 In regard to dairying and milk supply, the development of modern organised dairies began to be given attention towards the end of the First Five Year Plan. The dairy processing plants were linked up with rural milk production through milk collection and chilling centres. Collection of milk was organised through cooperative societies of producers in some cases and through middlemen in others. One of the major projects taken up since 1970-71 with assistance from the World Food Programme is the "Operation Flood." This programme aims at increasing milk supplies in the four metropolitan cities of Bombay, Calcutta, Delhi and Madras as also increasing milk production in 11 States and Union Territories to feed these dairy plants. From the planning point of view this was important, for, for the first time, the various aspects of milk production and distribution, the inputs, equipment, organisation and financing were worked out in detail and Project Reports were prepared before the project was taken up for implementation. The Project visualised management of the different aspects of the programme through one organisation, preferably the producers' cooperatives.

60.2.12 The programmes for development of poultry, sheep and pig were more or less on lines similar to those of cattle development. These consisted of organising Intensive Poultry/

Sheep/Piggery Development Projects, extension centres, setting up breeding farms, provision of health cover, some arrangements for feed and fodder. Bacon factories were set up for processing piggery products. Marketing arrangements were strengthened for poultry and poultry products and wool. Coordinated research projects were taken on breeding and other aspects concerning different species of animals.

60.2.13 In the fisheries sector, the development schemes covered both marine and inland fisheries. Reliance for increasing catches of marine fisheries was placed on introduction of small mechanised boats and medium sized trawlers, provision of landing and berthing facilities, supply of fishing requisites and development of processing and storage facilities. In the case of inland fisheries, emphasis was on expansion of production of fish seed - fry and fingerlings, encouragement to induced breeding and improvement of village ponds, reservoirs etc. An important scheme initiated in the Fifth Five Year Plan is the starting of Fish Farmers' Development Agencies.

60.2.14 Development of forestry also received increasing attention from plan to plan. Physical targets were fixed in respect of individual schemes of economic plantations. plantation of quick growing species, farm forestry-cum-fuelwood plantations, rehabilitation of degraded forests, communications etc., in the context of overall requirements of industrial wood and fuelwood. One of the important schemes from the point of view of planning undertaken in the Central sector in the Fourth Five Year Plan was the Pre-Investment Survey of Forests Resources, which laid the foundation for further exploitation and development of forestry resources in the areas surveyed.

3 APPROACH TO AGRICULTURAL PLANNING

Current Approach

60.3.1 The process of plan formulation has thus far been one of preparing in the first instance a plan frame at the national level primarily in terms of financial investments by major heads of development in the Planning Commission. This is followed up by an indication of guidelines, both in terms of overall financial allocations to State Governments and priorities to be observed in the formulation of State Plans. The resultant States' proposals were in subsequent discussions between the State Governments and the Planning Commission sought to be integrated into the national level plan formulated by the Planning Commission. In case of important programmes the concerned Central Ministries also circulated model schemes to the States. In India, plan formulation starts from above with a view to balancing investments, overall and sectoral, with available resources, internal and external. The programmes are built up at the State/district levels within the constraints indicated by the Central planning authorities. We are of the view that a more decentralised planning process would facilitate optimum use of regional resources. Also, some indication of resources likely to be made available from above, however tentative, would help planning agencies at lower echelons, formulate and implement plans and programmes with a greater degree of feasibility and realism.

Decentralisation of Planning

60.3.2 Agricultural potential is dependent on the soil, rainfall, temperature and irrigation facilities that are

available or can be made available. It is possible to divide the country into homogenous regions from the point of view of these attributes. Planning of physical infrastructure has to be linked essentially with such regions. Soil moisture is the most important single factor of plant growth and water management and moisture conservation are best done on watershed basis. Planning for soil-moisture regimen has therefore to be on watershed basis. Further programmes of crop and animal husbandry research and education have also to be planned on the basis of agro-climatic regions. It would thus be obvious that for a large complement of agricultural programmes, the unit of planning will be an agro-climatic region.

60.3.3 There are certain essential characteristics of agriculture which make it necessary to plan some aspects from lower levels e.g. the village, the block and the district. Though farm technology is generally transferable and can be imported and so also labour to some extent, land is a resource which is location-specific. In the case of water it may not always be possible to bring surface water to an area from outside. Ground water too can be utilised only on locations where it is available. Among other resources important from planning point of view, communications are also location-specific. Besides, agriculture under the new strategy demands a more rigorous planning of time schedules for agricultural operations, scientific water management, prompt diagnosis of pests and diseases and a more efficient system of input supplies and credit along with closer supervision over the various operations, all of which could be attended to more efficiently on a local or area basis. These constraints

indicate the need to plan from below certain aspects of agricultural development.

60.3.4 An effective unit for drawing up an integrated plan and budget for agricultural development however is the district. Different programmes in the field of land development, irrigation, input supplies, crop production and development of animal husbandry, fisheries and forestry can be brought together into a single plan at this level. It is also at this level that coordination of inter-sectoral plans should be effected. Thus while agricultural schemes and programmes can be built up from below wherever necessary and feasible, . . . planning in the real sense should be done at the district level. We have discussed the set-up at the district level for handling planning and coordination functions in Chapter 62 on Administration. It is however important that the water-shed and regional aspects receive due attention and the planning efforts at these levels in regard both to formulation and implementation are effectively coordinated and integrated with such efforts at the district and State levels.

60.3.5 The Indian village with its compact organisation of agricultural production, animal husbandry and village industry has always been the basic unit of the rural economy. Gandhiji realised its key position when he postulated the concept of self sufficient village. Commercialisation of agriculture has, however, brought about significant changes in the attitude of the villager and in his position in the rural set-up. Even so the fact remains that farming practised in a large number of villages is highly traditional and aims at self-sufficiency for the village as a whole. Animal husbandry

is built up mainly as a support to the village economy. Labour is generally immobile and the village community is by and large bound up with agricultural prosperity of the village. Agriculture being an individual enterprise, unless the village community is made to participate in development programmes, any effort for planning agricultural development from above is likely to bypass the actual producer.

60.3.6 With the decline of village community, it is difficult to maintain distributive social justice based on the concept of social responsibility. Had the socio-economic structure in the village been conducive to growth with social justice and had the community interest been maintained the task of agricultural development on village basis would have been more easy to organise. Though the cohesive village community leadership has disappeared in a large measure, traditional ideas of cultivation still persist, as also immobility of labour. It is still possible to put before a village a development plan based on scientific agriculture which can give benefits to all sections of the community. Such a programme for the whole village development has been postulated in our interim Report on Whole Village Development. This concept however, requires a strong and devoted leader who can counter initial reaction of the vested interests to the programme. As such a leadership is difficult to be forthcoming, large scale translation of this idea of village planning into practice does not appear to be feasible in the immediate future.

Nevertheless we strongly recommend that this approach in planning needs to be pursued in all seriousness even though on a pilot basis.

60.3.7 With the transformation in the socio-economic structure of the village and the dilution of economic functions of the village community leadership as also the obvious organisational and other constraints, the process of agricultural planning cannot be decentralised to the village level. However, it is still essential that any plans based on an area approach in terms of large water-sheds or agro-climatic regions should take the village as a nucleus. Farmers' participation in such a plan has to be mobilised by the agricultural extension organisation with the necessary help from other field organisations. The main difficulties which can be foreseen in developing this approach would be:

- (i) changing the traditional attitudes of the farmers in the area to adopt the new scientific agriculture;
- (ii) enabling small and marginal farmers in the area to take part in the programme by providing the necessary loans and crop finance; and
- (iii) providing a responsive extension organisation which can render almost individual service to the farmers in the area.

By and large the success of this approach would hinge upon the extent to which the credit and extension support needs of the small and marginal farmers joining an area development programme could be met. Since this is the back-bone of our approach towards agricultural planning we went into the question of providing an integrated organisation for sub-serving this need in our Interim Report on Credit Services

to Small and Marginal Farmers and Agricultural Labourers. The Commission has recommended the concept of a Farmers' Service Society (FSS) which can both deal with the credit problems on an area basis and provide the responsible extension organisation under the control of the Society itself. The experience of the Tudiyalur Cooperative Society in Coimbatore district of Tamil Nadu shows that a multi-purpose society which is development oriented can be very useful in putting across the message of scientific agriculture to the farmers of the area and also in organising new programmes of agricultural development in a short time. The large scale translation of the concept of the FSS into the field can help detailed area planning and development and give the nucleus at the local level for translating national ideas into action. We recommend that as an early spread of the concept will help substantially in area planning and implementation, this should be done.

Approach to Special Areas

60.3.8 Normally a regional approach which takes into account uniformity of soil, rainfall and temperature should be able to deal with all the water-sheds in the region on a fairly uniform basis. Only where irrigation is superimposed on the rainfall pattern of the region, will a different approach be necessary for agricultural planning. The difference will arise on account of the augmented availability of water from the irrigation system. As such in the irrigated areas even within a region homogeneous in respect of soil, rainfall and climate, different approaches would be necessary towards agricultural planning depending

upon the extent of additional water supply available from the irrigation system and its spread over time. This is being stated to emphasise that even under the same agro-climatic conditions, irrigation (and also other developmental measures like soil conservation, land shaping) would lead to a difference in productivity. This requires a careful appraisal of the local development profiles even within the same agro-climatic region. These factors along with the general socio-economic conditions of the area would have to be taken note of in detailed planning for production. Broadly speaking we can envisage a regional approach in rainfed agriculture supplemented with an individual approach to irrigated areas in the region.

60.3.9 For detailed planning, a region would be an unwieldy unit specially because our administrative systems are concentrated at the district. Officers of various disciplines and institutions who have to take a decision in every field of action are generally available at the district level. We have already observed that the district is an effective unit of planning for agricultural production. ^{It,} however needs support from the taluka/block levels. Therefore, if a region extends over more than one district, a plan of action can be drawn up for a region by discussion between the concerned district groups leaving the details to the district organisation.

60.3.10 In canal irrigated areas, agricultural planning requires a command area approach. There, the cropping programme will depend mostly on the capacity of the irrigation system to provide water for raising crops in the different seasons

taking into account the effect of soil and climate on crops under irrigated conditions. As a variety of crops can be raised under irrigated conditions, it gives considerable flexibility in crop planning for the area. In preparing ^{plans} for the district, therefore, the irrigated areas come in handy in apportioning proper emphasis on various crops.

4 PLANNING PROCESS

Formulation of the National Plan

60.4.1 Planning in India, as elsewhere, is essentially a backward and forward process: an exercise in successive iterations. The steps in the formulation of a development plan include: setting up ^{of} a target of overall economic growth; working out details of this target in terms of private consumption, gross investment, government expenditure, exports etc; projecting the output and other economic magnitudes by major sectors of the economy and by regions; and preparing programmes and projects within the framework of aggregate and sectoral levels.

60.4.2 In the light of the economic, social and political objectives of the Government, the Planning Commission lays down general guidelines for the development of the economy over a relatively long period, say 10 to 15 years, after a careful study of the possibilities. In the content of such a Perspective Plan, work on the preparation of Five Year Plans is undertaken. This process begins two or three years ahead of the commencement of the five year plan. The first stage is devoted to collection and analysis of basic data, review of existing programmes, working out of priorities and formulation of broad policies, strategy and programmes. This work is undertaken through a large number of working/planning/steering groups in the Centre and the States. The second stage involves the spelling out of the objectives and strategy to be adopted in the plan. For this purpose a draft outline of the five year plan is prepared by the Planning Commission for the

approval of the National Development Council under the chairmanship of the Prime Minister.. The Planning Commission also holds discussions with various organisations and interests on the draft outline. The third stage relates to concretisation of the plan and determining the quantitative aspects. This involves detailed discussions about the programmes of work and the financial resources available with the States and the Centre. Among the notable features in this stage may be mentioned the determination by the Committee of Chief Ministers of the National Developmental Council of the manner in which the Central assistance is ^{to be} distributed among the States and fixation of the quantum of Central assistance for the State plans. Physical programmes and the financial resources available are then discussed with the Chief Ministers of the States as also with representatives of the Central Ministries and finally in the Union Cabinet and the Parliament. These are, in brief, the important stages of the formulation of a five year plan in general.

Agricultural Sector Plan ^{sector}

60.4.3 The Agricultural plan is drawn up as part of the overall process of plan formulation within the framework of priorities and rate of growth of the overall economy indicated by the Planning Commission. For the formulation of the Fifth Five Year Plan, a Steering Group on Agriculture, Irrigation and Allied Sectors was set up by the Planning Commission in March 1972 under the chairmanship of the Minister of State for Planning. The Steering Group was to identify the subjects for which working groups/

task forces were required to be set up to undertake in depth studies of problems connected with formulation of Fifth Plan in respect of agriculture, irrigation and allied sectors and to determine their scope of work and composition. The Steering Group was also to indicate broad guidelines to the working groups/task forces and to review the progress of their work from time to time. It was also required to consider the reports of the various working groups/task forces and wherever necessary make suitable recommendations to the Planning Commission for further consideration. In the light of the decisions taken by the Steering Group the then Ministry of Agriculture set up Working Groups for the following subjects:

- i) agriculture (crop production);
- ii) land and water development;
- iii) agricultural pricing, marketing, processing and storage;
- iv) animal husbandry and dairying;
- v) fisheries;
- vi) forestry;
- vii) cooperation;
- viii) community development and panchayati raj;
- ix) land reforms; and
- x) rural development and employment.

The Working Groups composed of Central Government Officers at the technical and secretariat levels drawn not only from the Departments of Food and Agriculture but also from other departments concerned with allied fields like cooperation, irrigation and power, etc. The intention in constituting these

* Now Ministry of Agriculture and Irrigation.

Working Groups is largely to enable the pooling of all available knowledge and experience and permit the consideration of various problems in detail.

Annual Plans

60.4.4 Within the framework of a five year plan annual plans are drawn up taking into account the resources actually available from year to year. Around September each year the Planning Commission indicates to the State Governments the important objectives towards which the plan for the following year is to be oriented, intimates the order of Central financial assistance the State Governments could expect and asks for the draft proposals within the general frame of the States' five year plans. States are also asked to furnish proposals for raising additional resources to finance their plans in accordance with the resources and targets of the five year plan. Usually in November-December every year there are a series of consultations between the Planning Commission on the one hand and the Central Ministries and the State on the other for formulation of the annual plan for the ensuing financial year. During these consultations, progress of the plan of the preceding year is reviewed and the plan for the next year is formulated in the light of the resources available and technical feasibilities of different programmes as proposed by the State Governments. A similar exercise is undertaken in the Central Ministries in regard to the formulation of annual plans in the Central sector.

60.4.5 As in the case of five year plans, the annual plan proposals of the State Governments for the agricultural sector are generally considered by the working groups constituted in the Ministry of Agriculture and Irrigation. The working groups have their own sub-groups to consider individual programmes of development. The mechanism of annual plans has been considered to be quite useful in the sense that work on certain schemes which deserve greater attention gets accelerated in this process. The process of inter-departmental and Centre-State consultations also facilitates removal of bottlenecks and difficulties experienced in the implementation of various schemes through the initiation of remedial measures in the fields of financing, extension and research. The annual plans are, thus, the main operational instrument of the five year plans and lie closest to the stage of implementation. The mechanism of annual plans introduces, on the one hand, the much needed flexibility in the implementation of the five year plan and on the other, sets out the programmes of development to be implemented every year in sufficient detail.

State Plans

60.4.6 Regarding plan formulation at the State level, a time schedule is fixed by the Planning Commission for discussion with the State Governments. Before they come up for discussions with the Planning Commission, the State Governments analyse and finalise their approach towards the five year plan after consulting their planning and the concerned development and finance departments. The working groups constituted by the State Governments examine these proposals in the context

of a critical assessment of the achievements of the previous plan. The report of the working groups is considered by the State Governments in consultation with the State Planning Board, or the State Advisory Committee as the case may be.

The plan is then submitted to the State Cabinet. The plan thus approved goes to the Planning Commission for discussion.

60.4.7 The State draft plans are examined by the Planning Commission in consultation with the Central Ministries through the mechanism of working **groups**. The draft plans are finalised by the State Governments in the light of discussions with the Planning Commission. The final State plan documents which emerge are communicated to the Heads of Departments concerned for submitting plan schemes for approval of the Government. The Heads of Departments submit proposals for annual plans in conformity with the five year plan. The procedure for processing of annual plans is broadly similar to the one described above for the formulation of the five year plans. The Planning Department in the secretariat directs the whole process of the formulation of these plans at the State level.

Central Assistance

60.4.8 The schemes included in the plan could be classified into the following three categories:

- (i) Central plan schemes;
- (ii) Centrally sponsored schemes; and
- (iii) State plan schemes.

The Central schemes are implemented by the Central Government either directly or through its attached and subordinate

offices or through non-official agencies. These schemes are shown in the Central plan of the Ministry of Agriculture and Irrigation. The Centrally sponsored schemes are those which are sponsored and financed by the Central Government but are executed by the State Governments. These form a special category and only schemes which fulfil the following criteria are sponsored:

- (a) schemes relating to demonstrations, pilot projects, surveys and research;
- (b) schemes which have a regional or inter-state character;
- (c) schemes which require a lumpsum provision to be made until they could be broken down territorially; and
- (d) schemes which have an overall significance from the all-India level.

60.4.9 The State plan schemes are implemented by the State Governments and are included in the State agricultural sector plans. The States are free to sanction and implement State plan schemes, once they are approved during the annual plan discussions. During the First and the Second Five Year Plans, the State plan schemes were of two types, namely, "Pattern schemes" and "Non-Pattern schemes". The Pattern schemes were those that were financially assisted by the Government of India while the Non-Pattern schemes were financed by the States entirely from their own resources. From 1963-64 onwards, the Central assistance to States for agricultural programmes was earmarked. However, the plan schemes under different heads of development had their own patterns of assistance and the States could draw their grants and loans accordingly.

Another feature of this system was that the States which were financially better off were able to obtain a larger proportion of central assistance in the form of grant even though the total quantum of financial assistance from the Centre might be less in comparison with the less advanced States. For, the former could adopt, in view of their comfortable revenue position, such schemes as would attract larger amounts of grants.¹ The schematic pattern of assistance was discontinued during the Fourth Five Year Plan. The Central assistance is now not related to any specific scheme or programme under the State plans but is given to States through block grants or block loans. Each State gets a fixed proportion (30 per cent) of Central assistance in the form of grant and balance (70 per cent) by way of loan. In the case of agricultural programmes care is taken to see that the earmarked outlay is not diverted to other heads of development.

60.4.10. It is necessary to assess the total financial resources likely to be available for agricultural development in the form of plan allocations and committed non-plan funds as also from institutional resources. We recommend that the planning machinery in the States and at the Centre should make a continuing assessment of the needs and supply of total investment resources for the different sectors from plan as well as non-plan sources, and the plan programmes for agricultural development should be drawn up on the basis of this assessment for optimum utilisation of the total available financial resources.

¹Planning Commission, Fourth Five Year Plan 1969-74
July 1970, Page 55, New Delhi.

60.4.11 There can be no two views on the need for agricultural plans being based on realistic assumptions and not suffering from any inconsistencies. The general experience has been that the States prepare draft plan proposals without due regard to the limitation of the financial resources and during the course of discussions with the Planning Commission, these proposals have to be pruned to a considerable extent. One result is that size of the State plan and the provision for individual programmes included therein remain uncertain. In the process of pruning during the State plan discussions, it is likely that some times important schemes get lower allocations. There is also the possibility that plan priorities get distorted if the pruning is on a large scale. We consider that it is essential to have a closer coordination and understanding on methodology, approach and basic assumptions for formulation of plan proposals among the various working groups at the Centre and in the States. There should also be a greater involvement of representatives from States with field experience as well as non-officials, like agricultural economists, scientists and progressive farmers in these working groups.

60.4.12 The procedure for formulation and administrative approval of Centrally-sponsored schemes also needs to be simplified. Larger discretionary powers could be given to the Ministry of Agriculture & Irrigation in issuing administrative approval and expenditure sanction of approved centrally sponsored schemes. Further, while approving the model schemes the States should be given freedom to adjust the details within the broad objective of the model schemes.

5 PLAN IMPLEMENTATION

60.5.1 Proper and timely implementation of the plans is of the utmost importance in the planning process. If the scheme of allocations embodied in the five year plan is broadly adhered to in the annual plans, subject to adjustments which are deemed necessary from time to time, and resources are mobilised on the lines indicated in the plan, the desired objectives could be ensured.

Problems of Implementation

60.5.2 It has been observed that the major weaknesses in agricultural plan lie at the implementation stage. Sometimes sanctioning of new schemes takes a long time merely because of the procedural delays involved in inadequate decentralisation of powers. In some cases, the delay is also due to the lack of sufficient details when the schemes are formulated or their incomplete preparation. Further, some of the schemes have to be approved each year after the budget is approved by the State Legislature. Pending this approval, no preparatory work could be taken up. The preparation of detailed schemes is absolutely necessary for convincing the Finance Departments both at the Centre and in the States about the feasibility and desirability of the proposals. It has also been found that when programmes were not drawn up in sufficient detail, results achieved after their implementation were different from those originally contemplated. It was, for example, noticed during the Fourth Plan that some of the programmes taken up for the benefit of the poorer sections of rural population, in fact benefitted other classes of persons

also as the necessary checks and balances were not fully spelt out. The Draft Fifth Plan has, therefore, emphasised the need for detailed formulation of the projects and programmes and also enumeration of checks and balances and the supervision of these in some detail in order to achieve the desired objectives. We fully support this view and recommend that the schemes should be drawn up in sufficient detail so that they could be taken up as soon as the Plan is approved for implementation by the concerned authorities.

60.5.3 Greater decentralisation of powers and delegation of authority are also necessary for effective implementation of plan projects. It is stated in the Draft Fifth Plan that one important field where the need for substantial freedom of decision and action is keenly felt is the Area Development Programmes which have been introduced in a big way in the Fifth Plan. The Draft Fifth Plan formulations include a number of measures for expediting the process of decision making in respect of these programmes. It is, however, necessary that in respect of other programmes included in the agricultural plan, a careful review should be made of the current procedures and as far as possible, the powers of decision making should be decentralised.

Progressing and Evaluation

60.5.4 Continuous evaluation and appraisal of the progress are essential for ensuring successful implementation. A multiplicity of agencies are at present concerned with making appraisal of plan schemes, viz., (a) programme authorities in-charge of execution; (b) Ministry of Agriculture & Irrigation

and (c) Planning Commission. The Planning Commission calls for a progress report on the implementation of various agricultural programmes in the preceding year both from the State Governments and Central Ministries. On the basis of this information, the Planning Commission prepares a progress report. In addition, progress reports of individual projects involving large outlays are also prepared by the Central Ministries and concerned States. The progress of Central and Centrally-sponsored schemes in different subject-matter fields is reviewed on a quarterly basis in the meetings held by senior officials of the Ministry of Agriculture & Irrigation.

60.5.5 Scientific evaluation has been one of the weakest links in Indian planning, and has hampered the implementation of the development programmes. Though some kind of evaluation machinery does exist in the Planning Commission/Ministry of Agriculture and Irrigation, its organisation is inadequate and weak. Apart from the weaknesses of evaluation machinery itself, the evaluation has been ineffective because of inadequacy of coverage, delay in carrying out the studies and the timelag between the completion of the study and finalisation of the report. The need for an effective monitoring and evaluation (M & E) process to assist the implementing agencies in ensuring that optimum use is made of facilities which have already been created and that any new projects which are undertaken are executed on time and within the cost estimates, has been recognised in the Draft Fifth Year Plan. It has been envisaged that an effective M & E system would not merely keep the implementing agency adequately

and promptly informed about the progress of the projects but would give advance warning in respect of areas where potential bottlenecks or shortfalls are likely to arise so that adequate remedial measures could be taken, in time.

60.5.6 Apart from evaluation and appraisal of projects by the Government departments, we recommend that evaluation through independent and autonomous bodies like the agricultural universities and research institutes should also be encouraged. The evaluation should be concurrent and continuous. The Centre can also undertake pilot studies at selected points for specific purposes.

60.5.7 The patterns of Central assistance for individual schemes/projects were in vogue till the middle of the Third Five Year Plan. The release of Central assistance was, therefore, intimately tied up with the progress of expenditure on these schemes. This arrangement facilitated submission of periodic progress reports. Individual schemewise patterns of Central assistance were, however, dispensed with subsequently and reporting of progress on individual schemes was no longer tied up with the release of Central financial assistance. We consider that such reporting of progress on individual schemes projects is necessary in the interest of effective plan implementation and that the quality and coverage of reporting progress of individual schemes will improve with the setting up of the planning units at the different levels suggested in this Chapter.

60.5.8 Another point worth mentioning is that at the time of formulation of annual plans, though it is claimed that progress of individual schemes or a group of schemes is

reviewed, in actual practice this does not happen. The State Governments do not furnish full information in regard to progress of even major schemes included in the State plans. This is a serious gap which deserves attention. Suitable information and reporting systems need to be evolved so that those responsible for implementation can anticipate difficulties, judge at each step the progress and performance in relation to predetermined targets and take corrective measures.

Need for Coordination

60.5.9 Apart from marshalling of relevant data, provision for co-ordination and synchronisation of various aspects of a development programme is necessary for its proper implementation. The programme for increasing agricultural production comprises a large number of schemes and projects, some of which are directly related to agricultural sector, such as supply of seeds, fertilisers and pesticides, introduction of improved practices and implements etc; and some having a close bearing on agricultural performance like soil conservation, exploitation of water resources, development of communications and power, supply of credit, institutionalisation of marketing, provision of processing facilities and guarantee of minimum support prices. These schemes fall under the administrative control of more than one department and require to be co-ordinated if the thrust and direction of the development effort are to be ensured.

60.5.10 Since the inception of the Third Five Year Plan, certain steps have been taken towards improving administrative

coordination in matters relating to agricultural development. Coordination committees at Cabinet and secretariat levels have been set up in the States where decisions having a bearing on the coordinated working of the Departments of Agriculture, Irrigation, Revenue, Animal Husbandry, Fisheries, Forestry, Cooperation, Community Development, etc. are taken. In a number of States the posts of Agricultural Production Commissioners or Special Secretaries responsible for coordinating the activities of the above mentioned departments have been created. At the Centre, an Agricultural Production Board was set up to coordinate policies and ensure expeditious implementation of agricultural programmes. This Board has now been replaced by high-powered committees/boards/councils on important subjects like commercial crops, research, inputs, etc. At the apex, a Cabinet Sub-Committee on Agriculture, Food and Rural Development holds the responsibility for coordinated functioning of various departments involved in implementing programmes of development in the agricultural sector.

60.5.11 Another notable feature is the setting up of joint Central teams comprising officers from the Ministry of Agriculture and Irrigation and Planning Commission. These Teams visit different States every year to review the progress of agricultural programmes and formulate detailed proposals for their improvement in the light of priorities of development and availability of resources. This gives an opportunity to streamline the working of various important schemes included in the State annual plans. For purposeful pursuit of the planning process it is necessary that the recommendations of the Central teams are reflected in actual implementation of the various programmes. We hope that it would be possible

to follow up the recommendations of the Central teams in a more organised manner when the planning units proposed in this chapter have been set up at different levels.

6 PLANNING MACHINERY

Apex Organisation

60.6.1 The Planning Commission is the kingpin of planning machinery in the country and has the overall responsibility both for formulating the plan and watching progress of its implementation at the national level. In this task, it is assisted by the planning divisions of the Central Ministries and attached organisations. In many cases important policies and programmes originate in the Ministries and the Planning Commission's task in such cases is of providing guidelines to the concerned Ministries so that it is possible to integrate the policies and programmes with the overall plan formulations. In other cases, the ideas originating in the Planning Commission have to be given concrete shape by the Ministries concerned. The necessary coordination between the planning work done in the Ministries and the Planning Commission is carried out through the planning units set up in the Ministries and through the working groups set up at the time of plan formulation. The Programme Administration Advisers incharge of groups of States on regional basis, located in the Planning Commission, also render assistance to its Members in matters requiring field study and observations.

60.6.2 The subject-matter divisions in the Planning Commission are concerned with the formulation of detailed plans and programmes in the respective sectors. For example, the Agriculture and Rural Development Division is concerned with agriculture development, minor irrigation, soil conservation, animal husbandry, dairying etc. and keeps close

contact with the Ministry of Agriculture and Irrigation dealing with those areas of development at the Centre. Its function is to ensure that the proposals formulated by the States and the Ministry of Agriculture and Irrigation are integrated into the national plan of agriculture in the framework of financial allocations and priorities laid down by the Planning Commission.

Machinery in Ministry of Agriculture and Irrigation

60.6.3 In the Department of Agriculture of the Ministry of Agriculture and Irrigation, the Plan Coordination Division of the Directorate of Economics and Statistics (DES) is responsible for the organisation and coordination of the work relating to the formulation of five year plans and annual plans in the agricultural sector. The Plan Coordination Division is headed by Joint Commissioner who works under the Additional Secretary (Coordination) of the Department of Agriculture. The Division scrutinises the draft proposals formulated by the working groups and subject matter specialists in the Department for inclusion in the five year plan, works out the order of priorities and prepares the draft of the overall agricultural plan within the framework of the priorities and objectives indicated by the Planning Commission. The Division also studies the general problems of agricultural planning and development as also **prospects** for agricultural development. It reviews the progress of various schemes included in the agricultural sector of the plan and coordinates the work pertaining to Central and Centrally sponsored schemes of the Ministry of Agriculture and Irrigation.

60.6.4 Besides the Plan Coordination Division of the DES the Programme Implementation and State Liaison and Plan Coordination Units of the Department of Agriculture look after the coordination of annual progress of the State Plan schemes as reported by the various divisions in the Department of Agriculture. These Sections also coordinate the follow-up action on the recommendations of the Central Teams and maintain liaison with the State Governments. These Units are headed by a Joint Commissioner (State Liaison) who also works under the Additional Secretary (Coordination). The entire planning and coordination work along with administration and budgetting is under the ~~control~~ and supervision of an Additional Secretary in the Department of Agriculture. Thus, besides the Central and Centrally sponsored sectors which are the direct responsibility of the Central Ministry of Agriculture and Irrigation, that Ministry also has the responsibility for directing and coordinating the research and development efforts in the agricultural sector of the State level. The various subject-matter divisions of the Ministry would have, therefore, to develop the most suitable means of having a continuous dialogue with their counterparts in different States, on the emerging problems in the field. Such a dialogue would provide the necessary expert opinion to the State level officers and the feedback on the problems in the field to the Central experts.

60.6.5 In Chapter 62 on Administration we have recommended the creation of a well organised Planning Division in the Ministry of Agriculture and Irrigation to deal with formulation, coordination and evaluation of plans. This Division should function in respect of the entire agricultural sector. The existing Planning Division in the DES should be

transferred to the proposed Division. However, it would not be necessary for the Planning Division to have a Statistical Cell of its own since the DES will be able to feed it.

Further, the Planning Division as also the Budget and Finance Division should be placed under the Principal Secretary, Agriculture to enable him to act as an effective leader of the team.

Set up in States

60.6.6 The States have planning departments which coordinate the work of other departments for the preparation of development plans and present reports on the execution of State plans. In some of the States, planning boards have also been set up. The State Planning Department generally receives direction from a Committee of the State Cabinet or from the State Planning Board and is also supported by the State Statistical Bureau. Proposals for strengthening planning machinery at the State level have to be viewed in the context of the functions they are expected to perform. For example, successful implementation of major national policy objectives calls for an organisation at the State level which can coordinate effectively and provide guidance to local democratic bodies and take a wider view of development than is generally possible for individual departments.

60.6.7 Below the State level, there is no regular planning machinery. There is no organisation at the district level coordinating the work of different offices of the agricultural departments and non-officials agencies which are working independently. In most of the States, the coordination among

the agricultural development programmes is secured through the District Collector who acts as the Chairman of the district level coordination committee. In some States, a whole-time official of the rank of additional collector is entrusted with the work of coordination or coordination is sought to be achieved through the District Development Assistant. The coordinating agencies in the present set up have little scope for considering the local problems and priorities which might differ from the blue prints received from above. Even when an agricultural production plan was prepared at the village level by the Panchayats it was more of an exercise done by the official agencies in the context of the financial allocations and blue prints received by them from the above rather than an embodiment of the expression of the farmers of their problems, needs and methods of solving these problems.

60.6.8 In this system no farmers' organisations have had the chance to develop for reflecting the needs, the problems and the views of farmers on the policies and programmes for agricultural production. Those which have come to exist function only at the National or State levels and there was no communication between them and the cultivators on the problems and priorities of the agricultural development process. Sometimes seminars, conferences and workshops are organised at the national, regional and State levels under the auspices of official or non-official organisations to involve farmers in the process of plan formulation or secure their participation in the implementation of plans. However, these media are not effective and according to the Study Team

on Agricultural Administration set up by the Administrative Reforms Commission;¹ "appeals to farmers made through these media and the recommendations of these forums have often fallen on deaf ears. Most of the basic problems of farmers still remain to be tackled. It is no wonder farmers have been losing interest in the Government's programmes. In fact, they have developed scepticism towards these plans and programmesWithout the participation of farmers, the plans are becoming unrealistic and ineffective".

Improvements to Planning Process

60.6.9 Each successive five year plan has sought fresh ways of improving the machinery for plan formulation, implementation and evaluation in the context of four main characteristic features of the Indian situation, namely; (i) the federal set-up of the country; (ii) democratic structure with freedom given by the Constitution to all sectors of the people to function as political parties or as voluntary groups or associations; (iii) predominance of the private sector in agriculture; and (iv) commitment of the country to a policy of social welfare of the community and equality of opportunity.

State-Centre Consultation Process

60.6.10 It has already been emphasised in Chapter 8 on Centre-State Relations in Agricultural Development that the federal set-up of the country makes the development of the

¹Administrative Reforms Commission, Report of the Study Team on Agricultural Administration, Vol. I, September 1967, p. 52, New Delhi.

right relationships between the Centre and State imperative so that they can work as a part of a single system. Such a relationship has to be ensured through understanding and adjustments and determined on the basis of efficiency and economic viability. We would like to emphasise here that the preparation of a national agricultural development plan through the consultative process between the Centre and the States is the most efficient method of bringing the State plans and programmes into conformity with the basic national objectives. This consultative process is also important for building up the commitments of the Central and State Governments to the priorities in the Plan. It may also be stated that an exercise to develop agricultural production technology for distinct agro-climatic regions, however refined, cannot be the sole determinant of an agricultural plan. The Centre-State consultative process in fact fills the gaps that are inherent in an attempt to prepare a realistic plan on the basis of a technical exercise alone. Further, mutual consultation between the Centre and the States may provide a more reliable basis for planning specially in areas where there are inadequacies of technical and economic data. Due account has also to be taken of varying implementation and administrative capacities and the absence of uniform and consistent implementation of development policies essential for the success of the Plan. In a federal set-up the consultative process will, therefore, always remain the main channel through which the mutually agreed plan and policy framework are evolved.

60.6.11 A number of steps have to be taken to strengthen this consultative process. Under the present system, the Centre does not have complete knowledge about the details of the progress of plan schemes in the State sector. There has to be free flow of knowledge, ideas and experience from the lower to the higher stage of planning machinery and vice-versa, and therefore the consultative process which should start from the lowest level has to be intensive and continuous. The organisational set-up for agricultural planning at various levels namely, the block, district, State and Centre suggested in the Chapter 62 on Administration will have an important role to play in this process. The proposed planning units will be in continuous touch with each other not only in plan formulation but also in the implementation of programmes to facilitate continuous exchange of data and ideas from the lowest to the top level of administration. These units will also function as the main agencies for coordination between the Central and State Governments. It also needs to be mentioned that the present system of monthly or quarterly reviews at the Centre which are being conducted separately in respect of each subject-matter division for Central and Centrally sponsored schemes alone cannot help in the assessment of their contribution to the total development of the sector represented by them. Such reviews will have to be supplemented by integrated sectoral reviews as well as reviews of the total agricultural sector with the support of the proposed agricultural planning units. Such total and integrated

sectoral reviews of problems through the planning units will be instrumental in providing the necessary background and the required priority perspective for the annual plan discussions. In this way the plan could be formulated on a tested and realistic basis in the light of experience of implementation of the programmes gained and evaluated over a period of time.

60.6.12 The consultative process of plan formulation through the system of working groups suffers from certain limitations. The existing organisation and procedure of operation of these groups do not ensure continuous and detailed coordination among them. We have drawn attention to these in Chapter 8 on Centre-State Relations. We have suggested that there is need for representing the State experts on the working groups at the Centre, without making them unwieldy, so that a reasonable consensus might develop. The choice of members will depend more on their individual competence and expertise and not on considerations of regional representation.

60.6.13 People's participation: The democratic structure of the country makes it imperative for planning to be responsive to public opinion. Public participation and cooperation in the planning process have been sought to be achieved right from the First Plan through association of leading non-officials with the formulation and implementation of plans both at the district and the State levels. Amongst others, Members of the State Legislatures and of Parliament came to participate in district development committees and project advisory committees and some of them also served on the State planning boards. To bring about closer association

of Members of Parliament with the work of the Central Government, informal consultative committees composed of Members of the Lok Sabha and the Rajya Sabha were constituted, for a number of Ministries towards the end of Second Plan. These consultative committees were associated with consideration of problems of planning in different fields and at different stages. The Planning Commission conferred with the consultative committee associated with its work. The Planning Commission also suggested to State Governments that Members of Parliament from each State might be associated with work relating to planning as such association would be of considerable value in carrying out the plan. It was hoped that, in the States, arrangements would be made for informal consultation with Members of Parliament and the State Legislatures for reviewing the progress of the plan and organising the cooperation and support of the people in its implementation.

60.6.14 Information and control systems: The Fourth Plan document laid great stress on the importance of developing information and control systems for pursuing the progress of plan implementation as well as taking corrective action in time. The need for reviewing the procedures and staffing patterns of the planning departments in States for the purpose of pre-investment planning which involved an analysis of the resource potential, identification of programmes and projects and their preliminary formulation to be followed by feasibility studies, covering such aspects as demand analysis, technical developments, cost estimates, profitability analysis

and assessment of national economic benefits, was emphasised. It was also mentioned that the existing planning organisation did not provide for detailed study of either performance or the quality of the new proposals from different departments as a result of which integration of one scheme with another could not be ensured at the stage of plan formulation.

60.6.15 The draft Fifth Plan observes that the development of the organisational framework has not kept pace with the increasing variety and complexity of the task that State and Central Governments have taken on. Plan implementation has also been hindered by factors such as rigid compartmentalisation in fields which require a high degree of integrated multi-disciplinary activity, excessively wide or narrow spans of controls, lack of clear lines of responsibility, inadequate delegation of authority and improper relationship and positioning of line and staff functions.

60.6.16 Reorganisation at State-level: In the light of experience gained through working of successive five year plans, steps have been initiated to re-structure the planning machinery with a view to bringing about substantial improvements in plan formulation and implementation. At the State level these relate to reorganisation and strengthening of State planning departments/boards/commissions and setting up of steering groups for selected fields including agriculture and irrigation. The proposals for reorganisation of planning departments at the State level envisage, inter-alia, establishment of special units for monitoring plan information, evaluation and project appraisal, which had so far been the weakest areas in the implementation frame. Some streamlining

of the Central Ministry in the fields of animal husbandry, fisheries and forestry is also considered necessary for strengthening the set-up for planning at the Centre.

60.6.17 The outline of a State level organisation which needs to be developed for effective agricultural planning and development has been spelt out in Chapter 62 on Administration. However, it has to be recognised that the all-India or the State level programmes can only lay down the broad objectives of development. These objectives have to be translated into detailed field programmes by the field level administration which generally consists of three tiers, namely, the district, block or the taluka and the village. These tiers have to be seen as elements of an integrated system in the sense that each tier should support and derive its strength from the other. There may be growth potentialities in the district which are local in character and which have to be exploited through detailed planning at the district level. There is, therefore, need for a strong organisation at the district level which should be responsible for:

- (i) breaking up the policy directives from the State or even the Central level into suitable action programmes;
- (ii) organising and directing the field staff;
- (iii) fixing of detailed targets and standards of performance;
- (iv) progress analysis, supervision and coordination of the implementation of programmes;
- (v) review of procedures and methods of work; and
- (vi) feed-back to the State headquarters organisation.

60.6.18 We are of the view that only a strong planning organisation at the district level will be able to translate the regional/area approach to development particularly in respect of certain aspects of agriculture recommended in this chapter into action. It has therefore been suggested in Chapter 62 on Administration that there should be a separate planning and coordination unit dealing with progress and evaluation of agricultural planning under a Chief Agricultural Development Officer (CADO) who will function as the principal coordinator of all agricultural activities at the district level. There should be a unit at the Block level to watch the progress of agricultural development programmes under the Block Agricultural Development Officer who should be directly responsible to the CADO. The details of this set up have been discussed in that chapter..

7 METHODOLOGICAL PROBLEMS

Target Setting

60.7.1 In the formulation of an agricultural plan, one of the important tasks is the setting up of targets for various agricultural commodities. Several forward and backward exercises have to be done on different assumptions before obtaining the final results. Basically, the targets are determined taking into account the likely demand and supply position of agricultural commodities.

60.7.2 Demand projections: The first step in target setting is the determination of demand for various commodities at the end of the plan period or at the end of a perspective plan period. Determination of demand is not merely an arithmetic exercise. This has to be done keeping in view the main compulsions faced by the economy in a particular temporal context and taking into account qualitative as well as quantitative factors. Further, the demand may be the final demand for direct consumption items such as foodgrains etc. or the derived demand for agricultural raw materials worked backwards from the demand for finished products. The estimates of demand are worked out taking into account the composite effect of increase in population and in per capita income/consumption measured through appropriate income/expenditure elasticities of demand. The projections are usually made assuming no change in the price level. To the estimates so derived, are added the requirements for seed, feed, industrial uses and allowance for wastage so as to get the estimates of total (gross) requirements. Other considerations such as desirable and feasible nutritional

levels of diet, changes in tastes and preferences of the people etc., have also to be taken into account in making the demand projections. The methodological problems involved in demand projections have been discussed in detail in Chapter 10, dealing with projections of demand for selected agricultural commodities. We would, however, like to emphasise here that since the demand projections constitute the starting point in any forward looking exercise, it is necessary to constantly review and improve upon the methodology for projections of demand over a perspective period. It may also be added that the degree of reliability of all-India estimates of consumption demand could be greatly increased if the demand estimates are built up from State level estimates. Indicators of growth of demand for different commodities in relation to the level of demand in different States can be developed from the basic data available. We recognise that there are some specific methodological problems and data gaps in building up the demand projections from State estimates. It is necessary to devote resource and expertise towards this task in view of its importance in plan formulation.

60.7.3 Production potential: Having settled the demand, an appraisal of the production potential of agricultural commodities in the country has to be made. This has to be done taking into account the existing technical and organisational facilities as well as those which could be developed within the plan period with or without external assistance. In the case of agricultural commodities

the targets are fixed in terms of production potential expected to be created at the end of the plan period, often as an addition to the level of production reached at the end of previous plan period through measures such as extension of cultivation to new areas and intensive cultivation in selected areas. The latter include the use of high yielding varieties, multiple cropping, creation of additional irrigation facilities, measures for conservation of soil and development of land, increased use of fertilisers and manures and improved cultural practices. The additional production from different programmes is assessed on the basis of the 'yardstick approach' which assumes a simple linear relationship between the increase in output and the level of application of each input. During the first three plan periods, production targets of agricultural commodities were fixed on the basis of this approach. The yardsticks were initially established on the basis of some field experiments at the farm level or, in their absence, on the basis of expert knowledge that was available in the country. Towards the end of the Third Plan period the need for composite yardsticks was recognised in view of the high degree of complementarity among various inputs. This was considered all the more necessary with the acceleration of high yielding varieties programme which involves adoption of a package of practices. The composite yardsticks have been in use since the Fourth Five Year Plan in respect of area covered under the high yielding varieties programme.

60.7.4 Yardstick' approach: The yardstick approach has been one of the weakest links in agricultural planning. The yardstick is related to a specific dose of a single input even though the inputs are generally used in varying combinations and not in isolation. Even the concept of composite yardsticks is based on the assumption of optimum utilisation of given inputs in selected areas. In practice this may not be so. For example, in the Fourth Five Year Plan the target of rice production was expected to be achieved mainly by extending area under high yielding varieties from 2.6 million hectares in 1968-69 to 10 million hectares in 1973-74. According to the latest statistics, whereas the area under high yielding varieties of rice has been achieved, production fell short of the target significantly. Obviously the yardsticks used for estimating the target were not the correct indicators of the actual input responses under actual field conditions. For this reason, the production targets for different agricultural commodities, particularly foodgrains, fixed for different plan periods, were not realistic. We would emphasise here the need for a realistic assessment of the production potential in the country. For this purpose a careful assessment of the production potential has to be made in respect of different agro-climatic regions. The rainfall, altitude and latitude, the conditions of soil and seasons in different regions have to be carefully analysed for improvement of biological productivity. Different agro-climatic regions also differ widely in their natural endowments, input levels and institutional and administrative infrastructure. Further, even under the same agro-climatic condition there are

differences in productivity depending upon soil fertility, levels of inputs, management and other socio-economic factors. This requires a careful appraisal and complete restructuring of cropping patterns on agro-climatic and other considerations with a view to achieving optimum levels of biological productivity.

60.7.5 Till such time when adequate data base is available for making the appraisal referred to above, the use of yardsticks is inescapable. In order to be more meaningful the yardsticks should be fixed separately for relatively homogenous group of farms or at least for relatively homogenous agro-climatic regions. Further, they should be laid down for different crops separately. Yardsticks should be reviewed at the end of each plan period to take account of the technological changes that have occurred during the period. While the yardstick approach would provide rough and ready means for assessing the possible response of various inputs, it is also necessary to check the estimates of production from time to time by actual field surveys. Special surveys during the implementation of plan would also be useful for checking the estimates made at the plan formulation stage. Such surveys should particularly aim at ascertaining the input doses actually applied as against the recommended levels. Information on response factors gathered through such surveys would provide useful correction factors for the yardsticks in use.

60.7.6 In 'modern' agriculture organised on commercial lines, non-farm inputs constitute a substantial proportion of the total investment. It will, therefore, be necessary to involve input/output functions related to various levels

of application of inputs. Though it might be possible to derive production functions on the basis of data available from the farm management studies, these functions would not be adequate to depict the different situations occurring in different parts of the country.

60.7.7 The current practice is to lay down firm targets for the five year plan at the all-India level, and then break them up into statewise targets. No attempt is made to indicate the targets at the district/project levels. We consider that specific targets of production should be indicated down to the district/project level, which are the crucial levels of plan implementation. It is also necessary that the time perspective for realisation of these targets should be clearly set and strictly adhered to. This will help in spelling out the schemes and programmes at the grassroot level required to achieve these targets.

60.7.8 Aggregate output as plan target: Agricultural production is a biological process involving transformation into outputs of inputs. Because of this, it is not always possible to set forth the targets of production in terms of standard responses to various inputs used. The responses to both seeds and fertilisers vary from year to year depending on a variety of both controllable and uncontrollable factors. A major factor influencing production is weather. It needs to be mentioned that it is not merely the total amount of rainfall received, but also its distribution over the period of crop growth, particularly during critical periods, which influences the level of production. Similarly, the number of cloudy days or days of sun-shine, dew and frost and even the direction and

strength of winds at critical periods often influence the ~~ultimate~~ ultimate output. Thus, whereas the output in any given year is influenced considerably by weather factors in that year, of targets is done on normal weather assumptions. Further, at the time of the assessment of achievements against the targets at the end of the year, it becomes difficult to indicate how much of the shortfall or excess of output is due to failure or success of developmental measures and how much of it is due to the effect of weather. In these circumstances targets of production in respect of essential commodities have to be fixed in terms of not merely a single figure of final output but in terms of a range of outputs, or aggregate output during the plan period. A beginning in this regard has already been made in the draft Fifth Plan document which lays down targets of production of principal crops in terms of aggregate output during the plan period.

60.7.9 Livestock and fish production: The targets of production fixed for livestock and poultry products, fish and wood in the plan have no firm statistical basis at present. These targets are not linked with estimates of economic demand for those products nor to the nutritional requirements. The gap between nutritional demand and available supply was so vast that it was not feasible to aim at achieving the nutritional demands in a few plan periods. The physical programmes and production targets are also not correlated. The concept of yardsticks and production potential has yet to be extended to these products. We recommend that these gaps should be filled and that necessary investigations should be undertaken on a priority basis.

Resource Allocation

60.7.10 Once the production targets are fixed, a judicious selection has to be made of the development programmes and projects, the objective being to ensure as far as possible optimum allocation of available resources. Technical coefficients such as capital-output ratio, labour-output ratio and benefit-cost ratio, among others, could provide the necessary criteria for resource allocation. The estimation of capital-output ratio is a difficult task since agricultural production is subject to vagaries of weather and it is not possible to isolate the effect of weather in order to arrive at a normal relationship between capital and output. Further, in view of the new strategy of agricultural production involving use of high yielding varieties and other scientific methods of cultivation, the present technical input coefficients may not remain constant over time. It is also difficult to frame estimates of investment by a number of farmers in agriculture, particularly when part of such investment is non-monetised. The computation of labour-output ratio also suffers from similar problems. The benefit-cost ratio, though not faultless, is an efficient criterion for determining whether a project is economically viable or not. In the case of irrigation projects¹, we are of the view that the internal rate of return is a better criterion for evaluating the projects.

¹Vide Chapter 15 - Irrigation, paragraph 15.11.7.

Regional Imbalances

60.7.11 The programmes for agricultural development can broadly be classified into five categories i.e. those relating to:-

- (i) increase in area under the crop through extension of cultivation to new lands or through multiple cropping;
- (ii) provision of material inputs, e.g. high yielding varieties of seeds, fertilisers, plant chemicals and irrigation;
- (iii) undertaking measures for improvement of agricultural efficiency e.g. soil and water management, research and extension, farmers training and education;
- (iv) provision of economic incentives, e.g. price support, crop insurance, subsidies; and
- (v) undertaking institutional measures, e.g. land reforms, provision of credit, improvement of marketing system, cooperative servicing and farming.

In the ultimate analysis, only the first two items directly contribute to the increase in production. The new strategy of agricultural development, adopted in 1966-67 is mainly dependent on the second item. The stress under the new strategy is on the increasing application of science and technology for raising agricultural productivity. It has been observed that the new strategy of agricultural production with a promise of rapid development of selected areas has led to accentuation of various imbalances in the form of regional backwardness, neglect of dry areas, uneven spread of new technology between crops and neglect of small and marginal farmers. A systematic identification of areas

with low productivity and factors leading to it is a necessary pre-requisite for suggesting measures for improvement of productivity. Obviously, there is substantial scope for improving yield levels in the low productivity areas, given assured irrigation, high yielding technology, necessary inputs and a package of practices designed to give optimum yields.

Farmers' Participation in Programmes

60.7.12 A major difficulty in agricultural planning arises from the fact that agricultural activity is carried on by millions of farmers who take independent decisions. The success of agricultural planning lies in influencing these decisions in a given direction and in successfully bringing around the farmers to adopt the recommended technology and inputs on the desired scale. Farmers have to be motivated first through appropriate incentives to adopt the new technology; they have then to be provided with the technical know-how through appropriate extension techniques, e.g., field demonstrations, discussion groups and other audio-visual techniques. The availability of the right type of inputs at appropriate time and within easy reach has then to be arranged. Further, to ensure that these inputs are actually used by the farmers, it becomes necessary to organise credit facilities on an adequate scale. Finally to ensure that the farmers receive remunerative return on their labour and investment, the State has to provide the necessary market structure and facilities. Agricultural planning is, thus, a comprehensive effort starting with an assessment of the potentialities for production, drawing up development programmes to tap this potentiality and creating the necessary infrastructure to

ensure the availability of inputs, credit and marketing facilities needed by the farmers. We consider that the farmers' own organisations can further the interest of agricultural development more effectively than a governmental set-up. It will be desirable if the farmers' organisations operate in two separate but complementary wings, one dealing with economic and service functions and the other with promotional and welfare activities. For the former we have recommended in Chapter 55 on Credit and Incentives, the setting up of the farmers' service societies. For the latter we have recommended in Chapter 63 on Farmers' Organisations the setting up of farmers' unions or krishik sabhas.

Improvement of Data Base

60.7.13 The Commission also attaches importance to the need for improving the data base for formulation of plans. For estimating the expected contribution of various development programmes to the production potential of agricultural commodities, data on yardsticks of production are required. On the input side, cropwise estimates of consumption of fertilisers, manures and pesticides are needed along with data on dosages applied in relation to the recommended dosages. The water input is of great importance in improving agriculture. Statistics on irrigation by different sources, canals, tanks, tubewells and wells and other sources classified into surface and groundwater sources and crops irrigated are required every year. Data are also needed on areas provided with drainage facilities, particularly in heavy rainfall areas. Land-use is an important sphere

where multiple cropping, waste land reclamation and crop planning are assuming great significance. It is, thus, essential to have information on potential land use classification taking into account the natural endowments of different regions, availability of capital and other resources for development of land for its optimum use and the economic returns from alternative uses.

60.7.14 Availability of firm estimates of production of milk, eggs and meat products is essential for the realistic formulation of plans in the animal husbandry sector. Until recently these estimates were worked out on adhoc basis by the Directorate of Marketing & Inspection. Recently sample survey techniques have been evolved for estimation of the output of milk and other livestock products. The Livestock Statistics Cell in the Department of Agriculture is taking action to extend the surveys in different States. Statistical information on inputs for livestock and poultry production is also extremely important for providing the basis for estimating the relationship between the volume and quality of feed and the productivity of livestock and poultry.

60.7.15 Reliable data on national income and share of agriculture therein are indispensable for agricultural planning. Data on financial outlays in the public sector and investments by the private sector in agriculture and allied fields of development are also essential. Also, statistics of institutional finance through cooperatives, commercial banks and other agencies are equally important for formulating measures for channelling them in accordance with the needs of the development programmes. Statistics of labour force in

agriculture and employment, under employment and unemployment are also needed at sufficiently disaggregated level to facilitate the planning and evaluation of employment programmes.

60.7.16 There is another dimension of statistical analysis, which has to be developed to monitor the progress of plans especially from the point of view of eliminating chances of imbalances arising in different areas of economic activity. This is needed for preparation of "material balances" at various stages of plan implementation. The process of balancing should embrace all aspects of agricultural growth, i.e. supply of various goods against demand, of production against consumption, of imports against exports, of raw materials against finished goods, of investment against savings and of financial resources against physical targets. Ideally it is only within the framework of material balances that one can assess the factors which determine the demand for agricultural production. Considered alongwith the macro-economic assessment of plan and its broad industrial balances, these material balances provide the rationale for fixing output targets of principal commodities in the plan and give evidence on the balance and consistency of the plan.

60.7.17 The Planning Commission did not publish the numerical schemes of calculations connected with plan formulation till the Fourth Five Year Plan. Input-output tables which sought to establish the balance and consistency of the plan at the aggregate level were first published in connection with the Fourth Five Year Plan and included 77 sectors. The methodology was improved further and the

formulations for the Fifth Five Year Plan were based on an input-output table consisting of 66 sectors. A Technical Note on Approach to the Fifth Plan was published by the Planning Commission in April, 1973 giving the detailed methodology of these calculations. We are of the view that the detailed data used in the input-output tables and the technical co-efficients should be published on a regular basis. It is important that in a rapidly changing technological situation, such co-efficients should be brought upto date at five year intervals.

REGIONAL PLANNING FOR BALANCED DEVELOPMENT

Regional Disparities in Growth

60.8.1 The need for reduction in disparities and balanced development between different regions was recognised in the successive five year plans although the emphasis varied from plan to plan. The First Plan referred briefly to regional disparities while the Second Plan proposed dispersal of industries as a means of achieving regional development. The major policy statement on balanced regional development, occurred in the Third Plan in which the emphasis was on urban metropolitan city problems and development. In the Fourth Five Year Plan, apart from urban and metropolitan development, balanced development was sought to be achieved mainly through reduction in regional disparities. It was recognised that limitation of resources was the main bottleneck in undertaking large scale programme for reducing disparities. But as more resources became available, the backward regions were also sought to be benefited through special programmes in addition to the normal plan schemes. The principle of balanced regional development received operational significance by the study of disparities in the State incomes and allocation of Central assistance under the five year plans to States with lower per capita income. The State Governments were also asked by the Planning Commission to study the levels of development of the different districts on the basis of indicators of growth and development. The essential idea was that while the Centre would provide larger financial assistance to backward States, the States in their turn should allocate resources for the removal of disparities in development at the district level

and for identified backward areas. Thus, the concept of regional planning was intended to be operative through a policy and institutional framework from the national level to State and district levels. Some special assistance was also earmarked for the development of backward areas and special programmes were prepared for hill areas, tribal blocks and other such special areas.

60.8.2 In the agricultural sector, however, the growth process has been conditioned by certain overriding priorities which tended to relegate the objective of balanced regional growth to a secondary position. The major objectives of agricultural planning in the country have been achieving self-sufficiency in foodgrains and acceleration of agricultural development. The 'Intensive' approach to agricultural development adopted since the early sixties which was exemplified in area specific programmes like the IADP, IAAP and HYVP though had the logic of expediency led to aggravation of regional imbalances. As early as 1966 some economists had anticipated that the intensive approach was going to increase inter-personal and inter-regional inequalities in rural areas.

60.8.3 Attention has already been drawn to the wide inter-State differences in the compound rates of growth for agricultural production, area under crops and productivity during the period 1952-53 to 1964-65 in Section 4 of Chapter 3 on Progress of Agricultural Development. Though agricultural production at the national level increased at the rate of 3.01 per cent per annum during the period, growth rates higher than 4 per cent were recorded in certain States like

Punjab (4.56 per cent), Gujarat (4.55 per cent) and Tamil Nadu (4.17 per cent). On the other hand in certain other States, agricultural production increased at much lower rates e.g. Assam (1.17 per cent), Uttar Pradesh (1.66 per cent) and West Bengal (1.94 per cent). In Assam, Rajasthan and Kerala yields for all crops taken together were rather stagnant.

60.8.4 The continuance of the selective approach to agricultural development tended to aggravate rather than reduce the inter-State differences. A study of annual average increase in agricultural production and productivity in different States between the triennia ending 1964-65 and 1973-74 revealed that Punjab and Haryana realised annual average increases of the order of 8.35 and 6.67 per cent respectively in production largely through increases in productivity. States of Kerala, Tripura, Rajasthan, Manipur, Himachal Pradesh, Uttar Pradesh, West Bengal and Tamil Nadu achieved annual average increases in production varying between 3.1 to 5.0 per cent. Except in the case of Kerala, Tripura and West Bengal, increases in productivity largely contributed to the growth of production. In the case of Karnataka, though productivity increased at the rate of 3.95 per cent per annum, the average rate of increase in crop production was only of the order of 1.89 per cent due to shrinkage of cropped area. A somewhat similar phenomenon was also observed in the case of Gujarat and Andhra Pradesh. On the otherhand a deceleration in crop production and productivity was recorded in Orissa, Nagaland and Maharashtra.

The analysis revealed that the main factors ^{which} ~~accounted~~ for comparatively better performance by certain States were irrigation and increased use of modern farm inputs. These clearly indicate that the regional differences were increasing over the years. We would like to emphasise in this context that the objective of agricultural development planning should not merely be maximising production in overall terms but include considerations of regional balance, economic stability and growth with justice, as we have explained in Chapter 6 on Growth with Social Justice.

60.8.5 Normally, there are differences in the levels of income of large, medium, small and marginal farmers, and of farmers in rainfed areas and areas with assured irrigation. Wide variations also exist in net income from different crops. These differences have tended to widen as a result of the selective approach adopted under the new agricultural strategy combined with the existing institutional framework for credit and marketing. The agricultural planning process should provide remedies for reducing the three types of imbalances which have emerged over the various five year plans. The imbalances between the rainfed and irrigated areas are sought to be reduced through the implementation of special programmes for dry farming and agricultural diversification. Disparities in the other two categories can be reduced through research and development programmes for augmenting the productivity of various crops and by improving the facilities for supply of inputs, extension, credit and marketing to weaker sections of the farming community. These aspects have been dealt with in Chapter 59 on Special Area Development Programmes.

Regional Approach by Planning

60,8,6 An essential pre-requisite of regional agricultural planning is the classification of the country into agro-climatic or agricultural regions. There are wide regional variations in the agricultural resources of the country depending upon the physical, climatic and other endowments of different areas. Other factors such as levels of socio-economic development, demographic and cultural patterns are also relevant in this context. While formulating plans for agricultural development it would be useful to consider homogenous regions and draw up programmes for the full development of the potentialities that exist in each area. The Commission has identified over sixty homogenous agro-climatic regions, based on data relating to rainfall and area under crops. If the detailed soil patterns alongwith soil classifications and soil profiles are super-imposed, the number of detailed regions requiring individual planning will increase. In the ultimate analysis regional planning may be substantially district planning and as such the detailed work of plan formulation would essentially have to be done by the district planning cells. Where a region falls across two districts or more a coordinating committee could deal with the problem on adhoc basis. The pattern of development in each of the identified regions will depend upon the resource endowment of the area, potentiality for development and the nature of constraints to be removed. These regional agricultural development plans have to be tied up with the framework of overall national planning.

60.8.7 As each backward area represented a unique combination of factors, no uniform programme of development could be successfully conceived and imposed from the national level. An essential pre-requisite for accelerated development is therefore the evolution of appropriate location-specific strategies based on a careful identification of the causes of backwardness as well as the potential available for development. The pattern of development would thus differ from region to region. In Rajasthan, for example, some areas are suitable for crop production particularly where irrigation water is available, but over large areas livestock development would be more appropriate. Similarly, in Madhya Pradesh, wherever forests are important the emphasis in regional planning will be on the full development of this resource. The areas which generally lag in development are hill and tribal areas, and arid (hot & cold desert) and semi-arid areas, prone to drought. Besides, **there are** pockets in Gujarat and West Bengal which require special development measures to get over salinity problems. We have studied these special problems of these backward areas and have made detailed recommendations for tackling them in Chapter 59 on Special Area Development Programmes. We would emphasise that the objective of regional planning should be the economic advancement of each region so that the areas are able to contribute individually and collectively to the achievement of national plan objectives. The aim should be to ensure that all efforts for regional development are organised in such a way that they do not impede the rate of growth of the national economy and it should be possible to do this if a perspective plan for long term development is drawn up.

60.8.8 The need for detailed planning at regional level, thus, arises mainly because of the recognition of the fact that regional imbalances occur due to differences in factor endowments. In some areas, the resources may be available, but the infrastructure is not adequate to fully utilise the potential resources. In such cases, accelerated development of infrastructure will help open up new areas and in tapping of resources. On the other hand, there may be areas where potentialities for development of crop production may be poor. In such cases, the private sector is not likely to invest as the return on investment is likely to be low. The Government has therefore, a responsibility for the development of these areas. It is in such areas that there is need for introduction of programmes designed to benefit the weaker sections of the population through the development of animal husbandry, fisheries, horticulture, social forestry, etc.

60.8.9 Infrastructure development needs: We would like to emphasise that development of infrastructure is basic to the development of various backward regions. The first task in regional agricultural planning is, therefore, the identification and removal of inadequacies in the matter of infrastructural development. In order to make use of the facilities thus created, development programmes have to be undertaken simultaneously. Any time lag between the creation of the infrastructure and the implementation of the development programmes is likely to make the infrastructure infructuous. Further, the programmes for infrastructural development in backward areas have also to conform to a long-term policy within the available financial resources.

60.8.10 Tailor-made plans for areas: In each backward area, choices for investment are not so obvious and have, therefore, to be identified on the basis of a careful investigation of local potentials. The investment pattern should then be integrated into the framework of appropriate strategies evolved on the basis of the existing levels of productivity, trends of development, assessment of organisational capabilities, coverage and quality of infrastructure, patterns of consumption, production relations, vocational patterns and availability of skills and entrepreneurial availabilities. ~~Even~~ the identification of such areas and the constraints that are operating in them presents considerable difficulties due to the paucity of data and conceptual and methodological inadequacies. These deficiencies need to be overcome. Appropriate techniques for regional planning should be developed and steps taken to minimise the possible conflict between the criteria of efficiency and equity.

60.8.11 Perspective plans for agro-climatic regions: The growth possibilities in the various regions within a State and the need for change of strategy to get the maximum out of any region can best be analysed and formulated at the State level. It has been observed that the present cropping pattern in a region or the type of ~~animal~~ husbandry that is followed in the region may not necessarily be the best for the agro-climatic potential of the region. The cropping pattern, at present prevalent, may be a matter of tradition. Animal husbandry

¹Planning Commission, Draft Fifth Five Year Plan, 1974-79, Vol. II, January, 1974, p. 282, New Delhi.

development may not have been examined at all as has been the case in many regions with tremendous potential for this development. Planned development of animal husbandry as a commercial venture and marketing of milk and milk products as organised in certain areas of Gujarat have indicated what such developments can do. Analysis of the situation from this angle can best be done at the State level. States will have to take note of the various developments that have taken place in the country on pilot scale since the Second World War to understand the possible potential of their regions. Information on developments in other parts of the country with similar agro-climatic conditions can be obtained through the Central planning division, but the detailed planning and programming for the regions in the State will have to be done at the State level. We recommend that the Planning Cell under the Agricultural Production Commissioner in the State should undertake the detailed perspective planning for the various agro-climatic regions in the State. In this task, it will have to take the help of the agricultural universities and other scientific organisations and technical departments which can assist in formulating a detailed plan.

60.8.12 The State, having drawn up a Perspective Plan for the development of regional resources, the latter will have to be referred to the district planning Cells for consideration whether the changes postulated can be carried out under the socio-economic conditions prevailing in the country and within the existing infrastructure and

in what period of time. The district planning Cell can refer to the Central Planning Division through the State Planning Cell the problems that may have to be faced in detailed planning for development of infrastructure or removal of socio-economic constraints. The district planning cells should then keep note of the immediate constraints and plan the programmes to be carried out in the district in the light of the advice received from the Central and State planning units.

60.8.13 The State Agricultural Planning Cell should try to build into the State plan the necessary correctives to existing infrastructure and socio-economic constraints on the basis of the feed back by district cells within a specified time. The problems that cannot be resolved at the State level will have to be passed on to the Planning Division in the Ministry of Agriculture and Irrigation for examination in the perspective of the national plan and indication of the possible time schedule for various components of infrastructure development and socio-economic changes. It needs to be realised that this process of perspective planning and continuous evaluation, dialogue and adjustment are necessary for achieving quicker progress, in the regions within a reasonable time limit.

Infrastructural Planning

60.8.14 We should like to emphasise that along side with the need for macro planning for development of agricultural resources in various agro-climatic regions, there is an equally pressing need for infrastructural planning for maximisation of production and productivity. Such macro planning can be done only at the national level. Macro planning and policy guidance become necessary for irrigation, communications,

marketing and socio-economic changes. As explained in Chapter 15 on Irrigation, water use in various regions of the country is not equally productivity oriented. Irrigation patterns can certainly be adjusted to suit the requirements of crops and crops and varieties changed to suit the rainfall patterns. The relative cost factors that can be accepted for productivity and production development in areas of scarce rainfall can be decided only at the national and State levels. A consensus for planning water use can also be developed and operated only at the Central and State levels. Similarly for increasing productivity, communications have to be developed in areas where economic development is hindered due to lack of such facilities. In the Interim Report on Production Forestry-Man-Made Forests we had pointed out how in large areas of this country forests are deteriorating for lack of planned "exploitation. This is mainly due to inadequate communications and facilities for exploitation and regeneration. It has been pointed out that future investments should be fully commercial. The opening up of these areas for increasing productivity requires national planning in development of road and rail communications. There are areas like the north-eastern parts of the country and Himalayan hill ranges, where horticulture, animal husbandry and forestry can be developed. Communications and marketing are the two major problems in these areas. Both these can be solved ~~over~~ by national planning. Exploitation of seas for marine products has to be nationally planned for maximum productivity. We recommend that these problems of

macro dimension for increasing regional productivity and production to conform with our objective of growth with social justice should be taken up in hand at the national and State levels. The Planning, Evaluation and Coordination Division in the Ministry of Agriculture should take the lead in this matter.

Socio-political Factors in Regional Development

60.8.15 It has generally been the experience that the present level of production in an area does not truly reflect its potential. Areas similarly endowed by nature may not show similar trends in production or the same order of growth because of varying levels of exploitation of their resources. An important contributory factor for the inability to exploit resource potential in many areas has been the weakness of the existing socio-political structure. A change over from a rigid, hierarchical and tradition-bound system to a more flexible and modern one, which meets the requirement of a welfare State has not been equally rapid in all areas of the country. It has been particularly slow in backward regions. Only at the national level can policies and directions be evolved to bring these areas within the modern socio-political structure, built up on concepts of social equality and distributive equity, which facilitates rapid exploitation of resources for the benefit of the community.

60.8.16 The detailed work on regional plans would involve intensive training in the analysis of available data, identification of the constraints on development, formulation of suitable solutions to overcome these constraint and

finally implementation of programmes for development. These call for inter-disciplinary coordination among the scientists and planners in the relevant fields. This work should also be undertaken under the auspices of the planning units at different levels already referred to.

9 LESSONS OF PLANNING

60.9.1 Considering the vital role which agriculture plays in economic development of the country it has always been accorded a pride of place in Indian planning. However, in the process of formulation and implementation of agricultural plans, some major shortcomings have become obvious. Target setting on the basis of yardstick approach has been the weakest link in the sphere of formulation of agricultural plans. It also happens that the targets are not specified in sufficient details at functional levels, which results in delay at the implementation stage. Further, there is no systematic appraisal of progress which is essential for securing successful implementation of the plan.

Yardstick Approach

60.9.2 It is essential to constantly review and improve upon the methodology for projections of demand over a perspective period. The yardsticks which are used for estimating the production feasibility should be fixed separately for relatively homogenous groups of farms or at least for relatively homogenous agro-climatic regions. They should be reviewed at the end of each plan period to take account of the technological changes that have occurred during the plan period. Special surveys during the course of implementation of the plan would be very useful for checking the yardsticks used at the formulation stage. Information gathered through such surveys would provide useful correction factors for the yardsticks in use.

Progress Reporting

60.9.3 The quality and coverage of reporting progress of individual schemes on the part of most of States have suffered since the middle of the Third Plan when schemewise patterns of Central assistance were discontinued. At the time of formulation of annual plans, though it is claimed that progress of individual schemes or group of schemes is reviewed, in actual practice this does not happen. The State Governments do not furnish full information in regard to the progress of even the major schemes included in the State plans. Formulation, implementation and assessment of progress of agricultural development plans is also hampered by the lack of availability of reliable and comprehensive data on the various aspects of development. These are some of the major problems requiring urgent attention.

Planning Methods and Procedures

60.9.4 The efficiency of planning depends to a large extent on planning methods and procedures. It is necessary to streamline the procedure for finalisation and sanction of different kinds of plan schemes with a view to making them less time consuming. Care should also be taken to ensure that the plan, once formulated, is also reflected in the budget proposals of the States/Centre. There should be a close integration of the plan and non-plan outlays for the agricultural sector and the formulation of the agricultural plan should be based on proper assessment of total resources likely to be available from all sources. In the field of agricultural finance the role of non-government agencies, both institutional and private, should

be encouraged. The instrument of subsidies should be relied upon sparingly in the case of few important schemes concerning small farmers, backward areas etc.

Restructuring Planning Machinery

60.9.5 The problems of plan formulation and implementation arise out of weaknesses at different levels of planning machinery. Compartmentalisation of functions occurs within the agricultural sector arising out of the multiplicity of departments charged with ostensibly different but apparently similar responsibilities. This Commission has analysed in some detail the development and functioning of various planning organisations in the agricultural sector over the planning era. This analysis reveals that there have been two major constraints acting both on the work relating to formulation of plan programmes and their implementation, namely: (a) a large number of agencies were involved both at the Central and State levels which resulted in overlapping of functions and lack of coordination; and (b) there was hardly any established machinery available for agricultural planning below the State level.

60.9.6 Several recommendations have been made in this chapter for plugging these shortcomings. It is important that the Centre and States should work as parts of a single system in which the right relationship between the two should be guided by tests of efficiency and economic viability and ensured through understanding and adjustments. For effecting proper coordination between various agencies responsible for different aspects of agricultural planning, steps are already

contemplated under the Fifth Five Year Plan to restructure the planning machinery, at different levels. The draft Fifth Plan proposals also envisage strengthening and reorganisation of Planning Departments at the State level and establishment of special units for monitoring plan information, evaluation and project appraisal. We support these proposals.

60.9.7 As indicated earlier the concept of regional planning for balanced development was adopted from the Third Five Year Plan onwards. Comprehensive regional planning with special emphasis on agricultural planning will have to be organised in a more systematic and coordinated manner. The experience of regional planning so far indicates the weakness of the organisational set up, particularly the economic and statistical wing manned by trained personnel. Formulation of regional/agricultural plans would require collection of basic and interrelated data and selected data based on surveys and investigations.

District Level Organisation

60.9.8 In addition to these proposals, the Commission has presented in Chapter 62 on Administration an outline of the administrative structure at the State and lower levels which needs to be developed for effective agricultural planning and development. We would like to emphasise particularly the need for strong organisation at the district level. The district is the crucial operational unit in agricultural planning responsible for translating policy directives from the State or the Central level into suitable action programmes, organising and directing field staff, fixing

detailed targets and standards of performance, evaluating progress of various development programmes and providing the feed-back to the State planning organisation. The district planning organisation is also necessary to translate into practicable development programmes the regional/area approach to development in respect of those aspects of agriculture which have necessarily to be planned in terms of homogenous agro-climatic regions. To the extent possible, the planning process for agriculture needs to be decentralised. It would then be possible to take into account precisely, the requirements of individual areas, the special problems and their solutions. For example, the needs for groundwater and its exploitation can more appropriately be taken into account at the village level. Only a strong district planning organisation will be able to help in formulation of village plans, integrate them with the regional/area plans for irrigation, soil conservation etc. and ultimately bring them together into the frame work of the State plan.

10 SUMMARY OF RECOMMENDATIONS

60.10.1 The main recommendations are given below:

1. Plan formulation process has to commence from below, making optimum use of resources available locally, for the development programmes to be realistic and feasible.

(Paragraph 60.3.1)

2. At the district level, there should be an effective set up, both for drawing up integrated plans and budget for agricultural development and coordinating the implementation of various agricultural programmes at the field level.

(Paragraph 60.3.4)

3. Planning efforts at water-shed and regional levels, in regard to both formulation and implementation should be effectively coordinated and integrated with such efforts at the district and the State levels.

(Paragraph 60.3.4)

4. The concept of whole-village development needs to be tried seriously on a pilot basis. This concept requires a strong and devoted leader who can counter initial reactions of the vested interest to the programme of social justice inherent in it.

(Paragraph 60.3.6)

5. Alternatively, a plan based on an area approach taking a village and developing to a large water-shed should be tried. Farmers' participation in such a plan has to be mobilised by the agricultural extension organisation with necessary help from other field organisations. The farmers' service society recommended by the Commission can deal with

both credit problem on an area basis and provide responsible extension organisation under the control of the Society.

(Paragraph 60.3.7)

6. A district should ordinarily be the unit of planning for agricultural production except for irrigated agriculture where the unit would be the command area. Where the planning unit extends over more than one district, there should be close coordination between the district units concerned.

(Paragraphs 60.3.9
and 60.3.10)

7. It is necessary to assess the total financial resources likely to be available for agricultural development in the form of plan allocations and committed non-plan funds and those from institutional resources. Programmes for agricultural development should be drawn up on the basis of such an assessment.

(Paragraph 60.4.10)

8. There should be a closer coordination and understanding on methodology, approach and basic assumptions for formulation of plan proposals among the various working groups at the Centre and in the States. There should also be a greater involvement of representatives having field experience from States as well as non-officials (e.g. agricultural economists, scientists and progressive farmers) in these working groups.

(Paragraph 60.4.11)

9. The procedure for formulation and administrative approval of Centrally sponsored schemes needs to be simplified. Larger discretionary powers should be given to the Ministry of Agriculture and Irrigation in issuing administrative approval

and expenditure sanctions to approved Centrally sponsored schemes. The State Governments should also be given freedom to adjust the details within the broad objectives of the model schemes

(Paragraph 60.4.12)

10. Plan schemes should be drawn up in sufficient detail so that they could be taken up as soon as the plan is approved for implementation by concerned authorities.

(Paragraph 60.5.2)

11. Greater decentralisation of powers and delegation of authority are necessary for effective implementation of plan projects. A careful review has to be made of the current procedures and as far as possible the power of decision-making should be decentralised.

(Paragraph 60.5.3)

12. An effective evaluation system is essential to keep a watch on the progress of schemes and for keeping the implementation agency adequately and promptly informed about their progress. Apart from proper evaluation and appraisal of projects by Government departments, evaluation through independent autonomous bodies like the agricultural universities and research institutions should be encouraged.

(Paragraph 60.5.6)

13. Suitable information and reporting systems need to be evolved so that those responsible for implementation can anticipate difficulties, judge the progress and performance of these programmes in relation to pre-determined targets with a view to take necessary corrective measures.

(Paragraph 60.5.8)

14. A strong and well organised Planning Division should be set up in the Ministry of Agriculture and Irrigation combining the functions of planning, administrative coordination and concurrent evaluation.

(Paragraph 60.6.5)

15. The present system of periodic reviews at the Centre in respect of Central and Centrally sponsored schemes should be supplemented by integrated sectoral reviews as well as reviews of the total agricultural sector with the support of the proposed evaluation units.

(Paragraph 60.6.11)

16. There is need for setting up planning units at district level and corresponding units at the block level which should be responsible for formulating agricultural plans and keeping a watch over their progress. The functions of these units are given in paragraph 60.6.17.

(Paragraphs 60.6.17
and 60.6.18)

17. The methodology for formulating projections of demand should be constantly reviewed and improved upon. Apart from economic considerations other considerations such as attaining desirable and feasible nutritional levels of diet, changes in tastes and preferences etc. have also to be taken into account in making demand projections.

(Paragraph 60.7.2)

18. A careful assessment of the production potential has to be made in respect of different agro-climatic regions. The conditions in different regions have to be carefully analysed for improvement of biological productivity. Even within the same agro-climatic region

there are differences in productivity which require a careful appraisal for a complete restructuring of cropping patterns on agro-climatic considerations.

(Paragraph 60.7.4)

19. The yardstick should be fixed separately for relatively homogenous group of farms (or at least for relatively homogenous agro-climatic regions) and for different crops. These should be reviewed at the end of each plan period to take account of technological changes that have occurred during the period.

(Paragraph 60.7.5)

20. Specific targets of production should be indicated down to the district level which is the crucial level of plan implementation.

(Paragraph 60.7.7)

21. Targets of production in respect of essential commodities might be fixed not in terms of a single figure of final output but in terms of range of output or aggregate output during the plan period.

(Paragraph 60.7.8)

22. The concept of yardsticks and production potential should be extended to animal husbandry and fisheries sectors.

(Paragraph 60.7.9)

23. A systematic identification of areas with low productivity and factors leading to it is a necessary prerequisite for suggesting measures for improvement of productivity.

(Paragraph 60.7.11)

24. Agricultural planning has to be a comprehensive effort starting with an assessment of the potential for production, drawing up of development programmes to tap this potential and creating the necessary infrastructure to ensure the availability of inputs, credit and marketing facilities needed by the farmers to translate these programmes into practice.

(Paragraph 60.7.12)

25. The data base for agricultural planning should be improved on the lines indicated in paragraphs 60.7.13 to 60.7.17.

(Paragraphs 60.7.13 -
60.7.17)

26. The objective of agricultural development should not be merely one of maximising production in overall terms but should also include considerations of regional balance, economic stability and growth with social justice.

(Paragraph 60.8.4)

27. In the ultimate analysis detailed work of regional planning would essentially have to be done by district planning cells. Where a region covers two or more districts, a coordinating committee could deal with the problems on an adhoc basis. The regional agricultural development plans would also have to be tied up within the framework of overall national and State planning.

(Paragraph 60.8.6)

28. The evolution of appropriate location specific strategies based on careful identification of the causes of backwardness as well as the potential for development is an essential pre-requisite for accelerated development in backward areas. Appropriate techniques for regional planning should be developed to minimise the possible conflict between the criteria of efficiency and equity.

(Paragraphs 60.8.7
and 60.8.10)

29. There is need for introduction of programmes designed to benefit the weaker sections of the population through development of animal husbandry, poultry, fisheries, horticulture, forestry etc. in areas where the potentialities for development of crop production are low due to poor resource endowment.

(Paragraph 60.8.8)

30. Identification and removal of inadequacies in the matter of infrastructural development is basic to the development to various backward regions. Such programmes have to conform to a longterm policy within the available financial resources. It is also important that in such areas other development programmes are also undertaken simultaneously with infrastructural development.

(Paragraph 60.8.9)

31. The Planning Cell under the Agricultural Production Commissioner should undertake the detailed perspective planning for the various agro-climatic regions in the State. Agricultural universities and other

scientific organisations and technical departments should be fully associated with this process of formulating a detailed plan.

(Paragraph 60.8.11)

32. After a perspective plan for development of regional resources is drawn up by the State, the district planning cells have to examine how far under the socio-economic conditions prevailing in the district and in the existing state of infrastructure, the changes postulated can be carried out and in what time frame. District planning cells can also refer to the Planning Division in the Ministry, through State Planning Cell, the problems that may have to be faced in detailed planning for lack of infrastructure or socio-economic restraints.

(Paragraph 60.8.12)

33. The Agricultural Planning Cell at the State level should build into the State plan the necessary correctives on the basis of the feed-back by the district cells about existing infrastructure and socio-economic constraints. The problems that cannot be resolved at the State level will have to be passed on to the Planning Division in the Ministry of Agriculture and Irrigation to be examined in the perspective of the national plan.

(Paragraph 60.8.13)

34. Planning of certain aspects like irrigation, communications, marketing and socio-economic changes

have to be done at the macro (national) level. Water-use planning and the developing of a suitable infrastructure therefor has to be done at the State and national levels. Increasing the productivity of backward areas like north-eastern part of the country and Himalayan hill ranges, requires national planning of communications, both roads and rail. Exploitation of seas for marine products has to be nationally planned for maximum productivity.

(Paragraph 60.8.14)

35. Detailed work of regional planning would involve intensive training in the analysis of available data, identification of constraints on development etc. and would also call for inter-disciplinary coordination between the scientists and planners in the relevant fields. This work could be undertaken under the auspices of the planning units at different levels.

(Paragraph 60.8.16)

36. The procedures for finalization and sanctioning of different types of plan schemes should be streamlined to make them less time consuming.

(Paragraph 60.9.4)

37. Formulation of regional/agricultural plans would require collection of basic trend and interrelated data and selected data based on surveys and investigations.

(Paragraph 60.9.7)

S T A T I S T I C S

1. INTRODUCTION

61.1.1 Agricultural statistics in India have a long tradition. Artha Shastra of Kautilya (321-296 BC) makes a mention of their collection as part of the administrative system. During the Moghul period also some basic agricultural statistics were collected to meet the needs of revenue administration. In 1966, the British Government initiated collection of these statistics mainly as a byproduct of revenue administration and these reflected the then primary interest of the Government in the collection of land revenue. Subsequently, the emphasis shifted to crop forecasts designed primarily to serve the British trade interests. On a representation made by a leading firm of Liverpool, trading in wheat, the preparation of wheat forecast was taken up in 1884. By 1900, oilseeds, rice, cotton, jute, indigo and sugarcane had been added to the list of forecast crops. Improvements in the statistics collected were brought about through acceptance by the Government of the recommendations made by the Royal Commission on Agriculture (RCA), 1928 with regard to the quality and coverage of the statistics as well as for re-organising the country's statistical set-up.

61.1.2 During the Second World War, when the attention of the Government was focussed on the critical food situation, the need for timely and reliable statistics of food production was keenly felt for purposes of implementation of food policy

and administration of controls. The initiation of the crop-cutting experiments based on random sample surveys for estimation of yield rates of principal crops for replacing the traditional eye-appraisal method was the direct result. In 1949, the Technical Committee on Coordination of Agricultural Statistics (TCCAS) set up by the Ministry of Agriculture highlighted the gaps in agricultural statistics and the improvements necessary to remove the defects.

61.1.3 With the ushering in of the planning era in 1951-52, greater attention was paid to the improvements in the collection of statistical data on a number of items and schemes for improvement of agricultural statistics were implemented by the Central and State Governments as part of the successive five year plans. During the First and Second Plan periods, the Directorate of Economics and Statistics (DES), Ministry of Agriculture and Irrigation sponsored schemes for adoption of basic annual and quinquennial forms recommended by the TCCAS, extension of reporting area, estimation of production of protective foods and minor crops of commercial importance, rationalised supervision over the work of the area enumeration and preparation of index numbers relating to agricultural economy. A number of other organisations like the Institute of Agricultural Research Statistics (IARS), Central Statistical Organisation (CSO), Directorate of National Sample Survey, now re-organised as the National Sample Survey Organisation (NSSO) and the Indian Statistical Institute (ISI) also participated in the efforts directed towards the improvement of agricultural statistics in different ways. A standing Committee on Improvement of

Agricultural Statistics (CIAS) was set up in the Ministry of Agriculture in 1961 to guide and review the implementation of the schemes for improvement of agricultural statistics. Efforts for improving the quality and content of the statistics continued during the Third and Fourth Plan periods. In December 1969, a Data Improvement Committee was set up under the chairmanship of Dr. B.S. Minhas to look into the problems of improving the data base of the economy. In regard to agricultural statistics, this Committee made some useful recommendations for improvement to meet short term policy needs. In retrospect, the decade of fifties witnessed a period of initiation of new schemes for improvement of agricultural statistics, while during the sixties, efforts were made to consolidate the improvements.

61.1.4 The current status of agricultural statistics, the methods of their collection, gaps and lacunae with regard to their adequacy, timeliness, reliability and uniformity in concepts and definitions are given in this chapter. The chapter also deals with improvements in agricultural statistics including those of livestock, fisheries and forestry. The improvements necessary in the organisation for agro-economic research in the country are discussed in Section 19.

2 LAND UTILISATION AND AREA UNDER CROPS

Non-Reporting Areas

61.2.1 Land utilisation statistics are available in India almost continuously since 1884, although their geographical coverage has been changing from time to time and their scope has been gradually expanding. Out of the total geographical area of 328 million hectares, land-use statistics are available for roughly 306 million hectares. Thus, only for about 7 per cent of the geographical area of the country these data are not available. Of the 22 million hectares for which land use data are not available, 17.7 million hectares are located in Jammu & Kashmir and broadly cover the area under illegal occupation of Pakistan and China for which no data become available. The nonreporting area in other States largely consists of hill tracts in Arunachal Pradesh, Nagaland, Manipur and Tripura. Besides, there are small tracts in some States where due to the absence of cadastral survey and/or the village revenue agency, no regular statistics are collected. Some of these areas are also not accessible, being covered either by forests or by barren mountains. Regular cadastral survey of these areas is bound to take time. In some areas which are covered by barren hills or which are under snow all round the year, cadastral survey may not also be necessary. For completing the coverage of the land utilisation statistics, it should, however, be possible to estimate the geographical area of these non-reporting areas and their broad land use classification on the basis of aerial photographs coupled with broad topographical survey on the

ground. It is understood that aerial photographs are already available with the Survey of India and what is necessary is a proper interpretation of these photographs. The Commission had taken up with the Governments of Assam, Nagaland, Manipur, Tripura and Mizoram the question of preparation of ad-hoc estimates of land utilisation for the non-reporting areas falling within their respective territories. It is important that the coverage of agricultural statistics should be extended to the entire geographical area by 1978-79 at the latest.

Methods of Collection of Area Statistics

61.2.2 From the standpoint of collection of area statistics, the country can be divided into three categories. In the first category are the former temporarily settled States where the village revenue agency collects the statistics as part of land records. The agency consists of village officials* - one in-charge of a village or a group of villages. The collection of primary data on the basis of field to field inspection of crops and land utilisation at periodic intervals is part of their duty. After each crop inspection, the village official is required to submit to his superior officer a statement showing the land utilisation statistics in each season, in standard forms prescribed for the purpose. The superior officer called 'Kanungo' or Revenue Inspector, who is in

* The village official is called 'Patwari' in Punjab, Haryana, Jammu & Kashmir, Himachal Pradesh, Delhi, Rajasthan and Madhya Pradesh; 'Lekhpal' in U.P.; 'Karnam' in Tamil Nadu and Andhra Pradesh; 'Shanbhog' in Karnataka; 'Talathi' in Maharashtra and Gujarat; 'Karamchari' in Bihar and 'Mandal' in Assam.

charge of a revenue circle varying in size from 30 to 100 villages, controls and supervises the work of the village officials. The second category consists of former permanently settled States of West Bengal, Orissa and Kerala where no such village revenue agencies exist. As such, the land utilisation and crop area statistics in these States are based on sample surveys. The third category consists of areas which are neither cadastrally surveyed nor possess the requisite revenue agency and occurs in parts of both the first and second categories of States. In these areas the statistics reported are in the nature of eye-estimates based on the personal knowledge of the revenue officers as in the absence of cadastral survey and village officials complete enumeration and sample surveys cannot be conducted. Thus, of the total reporting

of area about 306 million hectares, estimates for 81.7 per cent of the area are based on complete enumeration, 9.2 per cent on sample surveys and those for the remaining 9.1 per cent of the area are based on conventional methods or impressionistic estimates by Village Headmen, Chowkidars and Superior Revenue Officials.

Agency for Area Statistics

61.2.3 In the areas where all fields have been cadastrally surveyed and mapped, the geographical area of each survey number and sub-number is accurately known and thus the area under the crop for a given region can be determined accurately. If, however, the whole field is not under the same crop or if there are included patches in the fields for which only the total geographical area is known, the area under the crop is normally estimated approximately by the Patwari. Thus, as a

system, the collection of data based on land records is the best provided the basic records are maintained properly. Since the basic land records are maintained by the Patwari, he is the best person to do the crop inspection. He is the most knowledgeable man in the field and, as such, the most suitable man for getting reliable information if he has the will to do it and if he can be persuaded to do an honest job or enabled to do so. Further, land records being authoritative and legal documents, data based on them have certain statutory validity also. The association of Patwari with the land records and the agricultural statistics brings to bear upon the system of collection, the authority and prestige that is associated with the revenue agency in the villages.

61.2.4 In actual practice, however, it has been found that due to a number of reasons, the Patwari does not devote the time and attention that is needed to the collection of agricultural statistics, resulting in inaccuracies in recording and delays in submission of returns. Firstly, the geographical jurisdiction of each Patwari is large, particularly in north India. Secondly, his functions and responsibilities have considerably increased during the recent years. The Patwari is called upon to assist the local development agencies in various ways including the certification of loan applications with regard to the title to the land offered as a security. Further, whenever any major campaign or programme such as population census, drought and flood relief, preparation of electoral rolls, elections, etc. is launched, his services are indented for.

It is these more pressing and immediate items of work which disrupt the normal schedule of duties of the Patwari with regard to the collection of agricultural statistics and timely submission of land records and other returns. Apart from this the basic reason for the unreliability and time-lag in the collection of agricultural statistics is the indifference shown by the Patwari and his superior officers to statistical data collection in recent years.

61.2.5 As the collection of timely and reliable agricultural statistics is basic to agricultural planning, we have given considerable thought to the question of improvements in the existing situation. The three possible ways to remedy the situation are: (a) to replace the Patwari by an alternative agency for the primary collection of statistics, (b) to see that the patwari agency works better under proper supervision with appropriate training and adequate guidance, and (c) to discard complete enumeration and have the basic data through random sample surveys. In our view, the creation of an independent primary reporting agency responsible for collection of agricultural statistics working under the Agriculture Department in coordination with the Revenue Department, need not necessarily bring about the desired improvement in agricultural statistics. Firstly, the number of such primary reporters needed will be so large as to be prohibitively expensive. Secondly, these primary workers too need the assistance of the Patwari with regard to the village map and the identification of survey numbers and even if the additional expenditure is incurred, it is doubtful whether this agency will have the authority and the prestige of the

Patwari to deal with agricultural statistics at the base level.

61.2.6 We have considered the alternative method of having independent sample surveys for providing the various agricultural statistics replacing the complete enumeration, but we do not favour this firstly because the sample survey cannot give estimates at lower geographical levels unless the number of samples chosen is very large; secondly such surveys will not give reliable estimates of the area under minor crops. For agricultural planning, particularly planning from below as recommended in Chapter 60 on Planning, detailed statistics at the block/taluk level and above are needed. As such, the method of sample surveys cannot be recommended as a substitute for complete enumeration. Sample surveys, however, have an important role to play, namely, in providing a check on the reliability of complete enumeration and also to give supplementary information needed for agricultural planning.

61.2.7 Thus, the only way of improving the basic structure for agricultural statistics is to enable the Patwari to do his job better and also to ensure that the Patwari and the revenue inspectors at higher level devote adequate attention to the collection of agricultural statistics and give top priority to the work especially during the periods of crop inspection. Firstly, the patwari agency should be enabled to work better by reducing the jurisdiction of each Patwari to manageable proportion. Secondly, intensive supervision both through normal revenue agencies and statistical staff, should be organised over the work of the Patwari. The primary

and supervisory agencies should, therefore, be suitably strengthened. The measures necessary for improvement of the area statistics through the Timely Reporting Scheme are discussed later in this chapter.

61.2.8 In fact, in our view, the method of complete enumeration should be introduced in the remaining three States of West Bengal, Orissa and Kerala also in a phased manner so that each year more and more areas are covered by this reporting system. The Governments of the three States have already accepted, in principle, this proposal, and its implementation is awaiting the allocation of sufficient funds in the plans. We, therefore, strongly recommend that immediate measures should be taken to establish the reporting agencies in the States of West Bengal, Orissa and Kerala also with a view to enabling the collection of basic agricultural statistics on a complete enumeration basis.

Training of Primary and Supervisory Agencies

61.2.9 Arrangements should also be made for imparting refresher training to the Patwaris and the Kanungos in the detailed concepts and definitions, filling up of proforma, etc for the collection of reliable and timely agricultural statistics at periodic intervals. Such a training was conducted in the year 1954-55 under which selected Tehsildars or officers of equivalent level from all the States were

trained in Delhi in three batches. The idea is that the Tehsildars, after they go back to their respective States, should train the Patwaris and Kanungos in suitable batches. We **recommend** that this training should be organised during the next two or three years; and repeated every ten years.

Adoption of Standard Forms

61.2.10 With a view to ensuring collection of land-use and crop area statistics according to standard classification and uniform concepts and definitions, the CIAS examined the basic and abstract land records forms and the land **records/** manuals of different States and suggested suitable modifications for adoption by the States. Although most of the States have accepted the revised proformas with necessary modifications to suit local conditions, some of them have not yet implemented them for one reason or other. It is necessary that the States should adopt the revised forms and concepts and definitions and also ensure that these are followed by the primary agencies.

Land-Use Classification

61.2.11 Before 1950-51, the land utilisation statistics for India were available under five categories, namely, (i) forests, (ii) area not available for cultivation, (iii) other uncultivated land excluding current fallows, (iv) fallow land, and (v) net area sown. This five-fold classification, though it gave a broad indication of land use in the country, was not found sufficient to meet the needs of agricultural planning. Also, due to lack of uniformity in the definitions and scope of the classification, the data collected in different States were not comparable. To remove

this non-comparability, and make the data more useful a more detailed classification was adopted in 1950-51 which gave the land utilisation details under nine classes. The details of the classification, together with standard concepts and definitions adopted, are given in Appendix 61.1. While the changes in classification, concepts and definitions and extension of reporting area, have improved the usefulness of the area statistics, they have introduced an element of non-comparability in the published data over time.

61.2.12 It must be remembered that the land use data give the distribution of land according to its actual use and not its potential use. While data on potential use are more essential for planning, these cannot be collected as a part of routine annual agricultural statistics. For indicating the potential land use, it is necessary to have special land use surveys which not only indicate the existing use but also the reasons why land is not being used for cultivation and also its suitability for other forms of exploitation, e.g. grazing, forests, pastures, etc. It is suggested that the State Governments should undertake a periodic survey of potential land utilisation in different areas. It will be found advantageous to confine these surveys to blocks of culturable areas on which preliminary information will be available through land utilisation statistics. Such data are necessary for proper land use planning.

61.2.13 In some of the States where consolidation of holdings has been done and land belonging to a single farmer has been consolidated into one or two large blocks, and where the farmer grows more than one crop in a block, difficulty of estimating the area under the individual crops has been experienced. This is because, in the new Khasra, after consolidation, the large block is given a single number and the area of the whole block is recorded. For facilitating recording of cropped area during crop inspection, the block should be sub-divided into suitable sub-numbers, and the area under each sub-number should be separately recorded in the Khasra.

3 STATISTICS OF CROP PRODUCTION

Crop Estimates

61.3.1 As already mentioned, the forecast of wheat was issued for the first time in 1884 and the forecasting system was subsequently extended to commercially important crops. In 1943-44, crop forecasts were prepared only for 10 crops. The scope of these forecasts, now called 'Estimates' was increased to 25 crops by 1951-52. ~~At present~~, crop estimates are issued for 37 field crops besides the plantation crops of tea, coffee and rubber for which the relevant estimates are prepared by the respective boards. A list showing the forecast crops and the years in which regular estimates were started is given in Appendix 61.2. Ad-hoc estimates are also prepared in respect of a few minor crops and regular forecasts are proposed to be introduced in due course for these crops. These are: papaya, sweet potato, indigo and opium. As agriculture becomes technologically progressive, new crops are introduced from time to time. For example ~~soyabean~~ and sunflower have been introduced in recent years. It is necessary that the new crops should be included within the scope of crop estimation system as and when their cultivation becomes fairly extensive. This implies that the State Governments should take steps to include these crops in the scope of crop inspection and in the preparation of crop abstracts.

61.3.2 Usually, two or three estimates or forecasts are issued during a year in respect of each crop with the exception of cotton and tobacco for which five and four

estimates respectively are issued. In respect of some minor crops such as castorseed, chillies, ginger, etc. only one forecast is issued. The first estimate giving the figures of area sown under the crop, is generally issued one month after the sowings have been completed in the major crop growing States. The objective of the first estimate is to provide intelligence as early as possible regarding the area sown and germination of the seed. The second estimate issued about two months later includes the area of late sowings and gives information regarding the condition of the crop in ~~different~~ parts of the country. The third and final estimate gives quantitative data on outturn harvested or expected to be harvested. The final estimate is required to be based on the crop inspection done by the Patwari; but the results of crop inspection are often not finalised in time and it is for this reason that there is delay in the issue of crop estimates.

Methods of Estimation of Crop Yields

61.3.3 The statistics of crop yield are obtained largely by the method of random sample crop-cutting surveys. These crop-cutting surveys are organised in different States by the state Bureaus of Economics and Statistics or the Departments of Agriculture or Land Records under the overall technical guidance and control of the NSSO. The field work is generally entrusted to the staff of the State Revenue/Land Records/Agriculture/Development Departments. The statistical design adopted for these surveys is one of stratified multi-stage random sampling with tehsils as strata, villages within the strata as primary sampling units, fields within each selected village as second stage units and finally

plot of specified size, usually 5 m x 5 m in the selected field as the ultimate sampling unit. From each selected village, generally, two fields growing the relevant crop are selected and from each selected field one experimental plot of the prescribed size is selected and located at random for conducting the experiment. The size and shape of the experimental plots for different crops in different States are given in Appendix 61.3. The produce from the plot is harvested and weighed and on a sub-sample of the experimental plots the produce is stored and re-weighed after drying so that appropriate allowance for driage is made in the estimation of average yield. The allocation of experiments between different strata is generally done in proportion to the area under the crop. At present 95 per cent of the production of cereals and 66 per cent of production of pulses are based on random sample crop-cutting surveys. In the case of rice and wheat, the two major cereals, the percentage of area covered by crop-cutting is 97 and 98 per cent respectively. The percentage of area covered by crop-cutting experiments in respect of different crops in 1973-74 is given in Appendix 61.4.

61.3.4 Under the second method called the traditional method, which is still adopted in respect of some minor foodgrains and other crops, the yield per hectare is obtained either in terms of a direct estimate in quintals per hectare, or in terms of annas in a rupee (formerly) or paise in a rupee in relation to normal yield by eye appraisal. The estimates based on the traditional method are, therefore, subjective in nature.

61.3.5 As a method, crop-cutting surveys based on random sampling technique is also sound beyond doubt. In ~~actual~~ implementation, however, deficiencies have cropped up even with regard to the crop-cutting experiments. It was noticed that separate stratification is not done in selecting the sample according to irrigated and rainfed areas and according to high-yielding varieties and others. Analysis of data collected during the crop estimation surveys (done after the random selection) has shown that the proportion of area under irrigation and that under high-yielding varieties in the sample differ considerably from those given in irrigation statistics and those obtained from the progress reports regarding the spread of high-yielding varieties. The Revenue Departments were not in favour of recording high-yielding varieties at the time of crop inspection on the grounds, firstly, that the identification of the high-yielding varieties was difficult for the Patwari and, secondly, that their inclusion would increase the number of columns in the Crop Abstract. However, the State Governments have agreed to collect the information as part of the Timely Reporting Scheme to which reference will be made in subsequent paragraphs. We suggest that steps should be taken to review the sampling design adopted for crop-cutting surveys with a view to adopting the stratification according to irrigated and rainfed areas and according to high-yielding varieties and local varieties of crops, particularly for important crops which receive the benefit of irrigation to a considerable extent and where high-yielding varieties

have been introduced on a sufficient scale. This will go a long way in improving the accuracy of the estimate of yield per hectare and of total production.

Independent Estimates of Crop Production

61.3.6 Independent estimates of area and production of seven major cereals were being collected by the NSSO in their regular rounds on sampling basis through the agency of general purpose investigators who were responsible for collecting data on all types of socio-economic items like consumer expenditure, population, employment, family planning, etc. Due to various reasons, the NSS data could not be utilised for official purposes. The National Sample Survey, however, gave up the independent series with effect from the twenty fifth Round (1970-71). This was also the recommendation of the Technical Committee on Crop Estimates (1967) set up by the Planning Commission under the Chairmanship of Dr.S.R. Sen.

4 RELIABILITY OF ESTIMATES OF FOOD-GRAINS PRODUCTION

Foodgrains Production Estimates - 1967-68 to 1969-70

61.4.1 From the methodological point of view **for** estimation of area through complete enumeration and that of yield through random sample surveys, the methods currently adopted in India are the best. Despite this fact, in actual practice, doubts have been expressed with regard to the reliability of the estimates of foodgrains production furnished by the States **es** and published by the Government of India. This is particularly so far the years 1967-68 to 1969-70 when the Government of India did not accept the figures furnished **by** some States and published estimates of production which differed from those furnished by these States. We have examined this issue a little more critically, in view of its importance.

61.4.2 By convention, the estimates of crop production published by the Government of India are merely aggregates of the figures received from the States based on the system of crop estimation referred to earlier. However, for these three years, an assessment of weather and crop conditions, progress of programmes of agricultural development, pace and pattern of market arrivals and price situation showed that the estimates of foodgrains production reported by some of the States had a substantial element of underestimation. It was felt that the prevailing system of recording of crop areas and estimation of yields did not fully provide for the developments in the field of agriculture introduced during the previous few years. In most of the States, till recently

there was no provision for recording of areas under short-duration varieties of crops grown in summer season, particularly rice. Further, as already mentioned, the sample actually selected for crop-cutting surveys did not reflect adequately the proportion of irrigated areas and of areas under high-yielding varieties in the population in some States. The non-response, in terms of experiments planned but not conducted, which was in many cases far in excess of the permissible limits, also affected adversely the representative character of the samples. The DES revised the estimates reported by some of the States upwards to make them more realistic. The magnitude of upward revision in different years varied from 2.7 to 7.7 per cent, the bulk of the underestimation being accounted for by Andhra Pradesh, Bihar, Madhya Pradesh, Karnataka and Uttar Pradesh.

Production Estimates based on Consumption Requirements

61.4.3 The Commission looked for evidence to indicate whether the revisions made by the DES were justified. With this end in view, an attempt was made to frame the estimates of consumption requirements on the basis of net availability of foodgrains in 1973-74 and by proceeding backwards after taking into account the composite effects of changes in population, per-capita real incomes, levels of prices of foodgrains (deflated by the wholesale price index) in each of the years. For arriving at the estimates of

production from the consumption data, statistics of net imports and changes in stocks were used. However, in the absence of complete data on the changes in stocks, only the stocks held by the Government were taken into account.

The estimated gross production of foodgrains based on estimated consumption, the estimates issued by the Central Government and those reported by the States are given in Table 61.1.

Table 61.1

Estimates of Production of Foodgrains
based on Consumption and Central and
State Governments' Estimates

(million tonnes)

Year	Estima- ted consump- tion*	Net imports	Changes in government stocks	estima- ted net produc- tion*	Estima- ted gross produc- tion+	Gross Production	
						Central Govt. estima- tes	State Govts. esti- mates
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1966-67	76.95	8.66	(-)0.26	68.03	77.75	74.23	71.86
1967-68	82.98	5.67	(+)2.03	79.34	90.67	95.05	92.54
1968-69	86.59	3.82	(+)0.46	83.23	95.12	94.01	87.81
1969-70	90.72	3.55	(+)1.12	88.29	100.90	99.50	96.05
1970-71	94.97	2.01	(+)2.57	95.53	109.18	108.42	108.42
1971-72	94.84	(-)0.50	(-)4.69	90.65	103.60	105.17	105.17
1972-73	95.72	3.59	(-)0.49	91.64	104.73	97.03	97.03
1973-74	95.95	4.83	(-)0.46	90.66	103.61	103.61	103.61
Total:					785.56	777.02	762.49

* The method of estimation of consumption in Column 2
is given in Appendix 61.5

** Col. (5) = Col. (2) - Col. (3) + Col. (4)

+ Col. (6) = (5) multiplied by 8/7.

61.4.4 It will be seen that the estimated figures of gross production based on consumption are nearer the Central Government's adjusted estimates, in fact even higher in some cases, confirming the Central Government's contention that the State figures in many cases were gross under-estimates. However, even this method (Appendix 61.5) does not give an objective basis for correcting the States estimates. Further, this method can be applied only after the crop year is over.

Need for Improvement in Methods of Collection

61.4.5 To study the question in some detail, a Study Team was set up under the chairmanship of Dr. B.Ramamurti, ex-Regional Statistical Adviser to the United Nations and consisting of the representatives of the CSO, the ISI, DES and IARS for a deeper probe into the foodgrains production estimates for the years 1967-68 to 1969-70 and for evolving an objective approach for arriving at an agreed set of estimates.

61.4.6 After detailed examination of the methods of collection of statistics of area and yield followed by the States including the design of crop-cutting surveys and supervision of field work and also special visits to a few States, the Study Team came to the conclusion that "the estimates furnished by the State Governments cannot unquestionably be taken as correct estimates and we agree with the Ministry that they need to be critically examined." In regard to the upward revision of the estimates furnished by the State Governments which were

considered unsatisfactory, the Study Team expressed its helplessness in providing any objective basis for such revision. It, therefore, opined that it was important to implement suitable measures for improvements in the design, methods of collection and scientific compilation and estimation so that, in future, better estimates were made available by the established agencies. We are in full agreement with the views of the Study Team that the State Governments' estimates of foodgrains production were unsatisfactory for the period 1967-68 to 1969-70 due mainly to the defects in the field implementation of methodology. Subsequently, it is understood that the Ministry of Agriculture and Irrigation has taken a policy decision to adopt the figures furnished by the States after due scrutiny in consultation with the States. Without going into the merits and demerits of this decision, we wish to emphasise the need for effecting improvements in the methods of collection of statistics. It is important that not only the techniques employed should be scientific but due attention should also be paid to the implementation and supervision of the techniques as adopted in the field.

5 IMPROVEMENT OF CROP STATISTICS

61.5.1 To be useful for planning and formulation and implementation of policy, the statistics of crop production should be available on time. In fact, "advance estimates" of likely production of foodgrains are required when the crop is still in the field in order to enable the formulation of food distribution, import and price policies. The final estimates of area based on the crop inspection done by the Patwaris are available with a considerable time-lag. The yield estimates based on crop-cutting experiments are also not available on time with the result that the final estimates are released long after the crop is harvested and sometimes even consumed. On many occasions, the State Governments send to the Centre, final estimates of crops before all the reports based on crop inspection of area and all returns in respect of crop-cutting experiments are received by them. Because of this the final estimates need revision when the fuller estimates are available subsequently.

Timely Reporting Scheme

61.5.2 In order to reduce the time-lag between the sowing and harvesting of crops and the availability of estimates of area and production respectively, a Centrally sponsored scheme for Timely Reporting of Estimates of Area and Production of Principal Crops (TRS), was initiated by the Ministry of Agriculture and Irrigation in the year 1969-70. Under the scheme, the villages in each stratum (tehsil/revenue inspector circle/patwari circle) are divided into 5 independent non-overlapping sets, each

comprising one-fifth of the total number of villages. In the case of States where area statistics are collected by complete enumeration, one set of randomly selected villages is chosen for crop inspection on priority basis immediately after the sowings in each season are completed, but in advance of the period prescribed in the land records manuals for such crop inspection. Thus, the Patwaris in-charge of the selected villages are required to complete the crop inspection well ahead of the normal time in one-fifth of the villages. After the crop inspection in each season, the abstracts giving the total area under different crops are furnished by the Patwari through his immediate superiors and these are tabulated at the State headquarters to give the estimates of total area under the crop. There is also provision for both normal and statistical supervision of the work of the Patwaris in these selected villages. The idea is that, if each year, a different set of villages is covered under the scheme, within the course of five years, all the villages will be covered and in each village, at least in one year in five. the crop inspection is done systematically under intensive supervision.

61.5.3 In the case of States like West Bengal, Orissa and Kerala, where village revenue agencies do not exist it is proposed to introduce a miniature TRS by having field to field enumeration of crop areas in all the three crop seasons in about 10 per cent of the villages. There is also provision for **supervision at** different levels. We understand that this scheme has been sanctioned and is being implemented with effect from 1975-76.

61.5.4 The TRS provides for recording the area under irrigation as well as area under high yielding varieties in the selected villages. Besides ensuring accuracy and timeliness of the enumeration of the area under crops, statistical staff under the scheme is required to inspect the field work of crop-cutting experiments and ensure timely despatch of the returns. This scheme has been taken up in a phased manner in different States beginning with Uttar Pradesh and Maharashtra. It is now in operation in 13 major States. The scheme should be extended to the remaining States by 1976-77.

61.5.5 An evaluation study of the scheme has shown that there has been a noticeable improvement in the timeliness and reliability of the estimates in some States. However, the checks carried out by the staff of the NSSO have shown some defects in the implementation of the TRS. These require close attention. There is a tendency to treat schemes such as TRS as a routine after a few years and the attention which is paid to the supervision in the beginning is not sustained. It is important that there should be a unit in the DES to exercise constant supervision to ensure the quality of the field and supervisory work done in the States under the TRS. The services of the Regional Staff of the DES referred to later should also be utilized for supervising the scheme.

Scheme for Improvement of Crop Statistics.

61.5.6 While the implementation of the TRS in the States will improve the timeliness and reliability of the statistics of area and production, it is necessary to introduce an element of joint Central and State supervision on the field work done in the States with regard to the collection of agricultural statistics. The advantage of such a system is that the Ministry of Agriculture and Irrigation, which is responsible for the formulation of food policy at the all-India level, has at its disposal timely estimates of area and production. Further, the joint inspection will also bring to light the defects in the system from time to time. In fact, the NSSO, which is responsible for the technical supervision and guidance of the crop-cutting experiments, was also doing pre-harvest and harvest stage inspection of crop-cutting experiments. The sample selected for such supervision was, however, not large enough for giving any independent estimate of average yield with a reasonable degree of precision in at the all-India level.

61.5.7 A scheme for Improvement of Crop Statistics has been drawn up by the NSSO and the Ministry of Agriculture and Irrigation in consultation with us. This scheme provides for a sample check of area enumeration and crop-cutting experiments in about 5,000 sample villages by the NSSO and in an equal number of villages by the whole-time State supervisory staff covering 17 States, excluding some of the north-eastern States and Union Territories. From the villages selected for TRS or mini-TRS, as the case may be, a sub-sample is chosen randomly for conducting crop-cutting experiments.

Two sets of 5,000 villages each are selected at random, one for supervision by the staff of the State agricultural statistics authorities and the other for supervision by the NSSO staff. Under the IRS, the Patwari is expected to do the crop enumeration in these villages within the first 10 to 12 days of crop inspection period. Shortly after the expiry of this period, the supervisory staff of each agency undertakes a physical check of crop area enumeration in 20 survey numbers in each sample village and compare it with the entries by the Patwari in the Khasra register. In addition, the page totals and totals of area under different land use classes and crops in the village Khasra are also checked. The supervisory staff of each agency also exercises sample check of crop-cutting experiments in selected villages. Out of the total number of crop-cutting experiments planned in the villages selected for supervision, a certain number specified for each crop are supervised at the harvest stage. The supervision of the remaining crop-cutting experiments in the selected villages is carried out at the pre-harvest or post-harvest stage as feasible. About 30,000 crop-cutting experiments are inspected at harvest stage spread over foodgrains and commercial crops. There is exchange of results between the Central and State agencies and each agency is required to undertake analysis of the sample checks of enumeration of the crop area and crop-cutting experiments in respect of both sets of supervised villages.

61.5.8 Thus, the NSSO organises a quality check on the State estimates by comparing the estimates of area and yield based on Central and State supervised samples and again by comparing these figures with those of the TRS and the estimates based on complete enumeration of 100 per cent villages and analysis of results of all crop-cutting experiments. Where there are large differences between these figures, the scheme provides a basis for examining them and also for suggesting measures for improvement. The nature of differences between the Central and the State supervision results and between the supervised and non-supervised data are examined every year by the NSSO and included in the Report on the Status of Agricultural Production Estimates prepared by the Agricultural Statistics Wing of the NSSO. Technical advice is offered to the States for effecting lasting improvements in the crop estimation system on the basis of these results.

61.5.9 One advantage of this new scheme is that for preparing advance estimates of area and production of principal crops for various purposes, the Ministry of Agriculture and Irrigation can make use of the estimates of area and yield based on the Central and State supervised sample results and the estimates of area received under the TRS wherever these are available earlier. The final estimates of production will be based on the data furnished by the States on the basis of complete enumeration of all the villages or sample surveys in West Bengal, Orissa and Kerala and analysis of results of all crop-cutting experiments. However, in cases where there are wide differences between the figures of area based on

supervised sample and complete enumeration, the nature of the differences will have to be examined with a view to evolving objective procedures for making selective use of the supervised data. In the case of estimates of yield per hectare when the results of Central and State supervision are in broad agreement but the pooled results of supervision differ widely from the results of un-supervised experiments at district and State levels, the final estimates of the concerned crop for the concerned district/State can be based on the supervised data in consultation with the State authorities. The Scheme has been implemented on a limited scale from the rabi season of 1973-74 by organising the programme on wheat in 9 important rabi States and is being implemented with effect from 1974-75 in 17 States. The survey will cover about 5,000 villages in 1975-76 and about 15,000 experiments will be supervised. A technical Working Group is examining the results of sample check thrown up by the 1973-74 survey with a view to determine the modifications necessary in the design of the sample, sample size and the estimation procedures in order to enable the building up of reliable estimates at the State level.

Recording of the Area under Mixed crops

61.5.10 There are a few other matters regarding the improvement of statistics of crop areas which need some attention. There is the practice in several parts of the country to grow mixtures of two or more crops in the same field as an insurance against the vagaries of weather. Mixed cropping is also followed for extraction as well as restoration of soil fertility at different depths. Mixed cropping enables optimum utilisation of space. Keeping

in view the difficulties in the recording of area under each of the constituents of mixed crops, considerable attention was devoted in the fifties to the methods to be adopted for the purpose. Land records manuals in the different States prescribe various procedures for the recording of area under mixed crops which vary from State to State. The CIAS prescribed a standard procedure and recommended it for adoption by all the States. In cases where the crops in the mixture are grown in rows and the total area under the mixture can be divided among each crop in the ratio of the number of rows under each the problem becomes relatively simple. In other cases, where the mixed crops are broadcast, the gross area under the mixture can be apportioned at the source itself on the basis of eye appraisal. In some States the gross area is recorded separately for each mixture at the field level and the apportionment is made at the district level according to set formulae. The Committee recommended that these proportions at the district level should be reviewed on the basis of data collected through crop-cutting experiments and revised where necessary. These proposals need to be implemented in all the States.

Recording of Area under Summer Crops

61.5.11 With the introduction of short-duration and photo-insensitive varieties, the sowing and harvesting seasons have undergone a change in many areas particularly under irrigated conditions. Normally, two to three crop inspections are done in a year in the different States. In some States there is no provision for inspection during the summer season. Thus, the late sown summer crops are not

recorded. It is necessary for each State to review, at the district level, the sowing and harvesting seasons of different crops in consultation with the District Agricultural Officers and revise the periods of crop inspection where necessary in the light of such a review. This should be done under the auspices of the TRS. Reference in this connection is invited to our observations in paragraph 21.2.3 in Chapter 21 on Foodgrain Crops regarding the revision of the reporting system for area under rice on the basis of two-monthly sowing periods due to the defects in the present classification of rice into autumn, winter and summer and the introduction of many new varieties whose growth behaviours are different from the traditional ones.

Reconciliation of Different sets of Estimates

61.5.12 There is also another problem with regard to the estimates of production of crops to which we would like to draw attention. This is in regard to crops like cotton, where trade interests put out periodical estimates which differ considerably from official estimates. Post mortem examination of the cotton crop based on its utilization for different purposes and on the data on pressing and ginning returns shows that the trade estimates are nearer the actual crop and that the official figures are under-estimated. Past efforts at the reconciliation of the two sets of data have not succeeded in narrowing the difference. With the implementation of the new scheme for Improvement of Crop Statistics taken up by the NSSO, it should be possible to resolve this problem, very soon. Similarly, in the case of tobacco, the figures of production based on the data

collected by excise authorities differ considerably from the official estimates issued by the DES. Steps are necessary ~~to~~ to reconcile the two sets of figures. Similar discrepancies exist in the case of pepper, cashewnut etc. which also need early reconciliation. Attention has been drawn to this problem under the section relating to Fruits and Vegetables Statistics.

Advance Estimates of Crop Production

61.5.13 We have already referred to the need for having advance estimates of area and production for food policy and administration. It is often necessary to keep a continuous watch on the areas sown to crops and the likely output.

At present, information regarding season and crop conditions is obtained through weekly reports received from the State Governments. The possibility of getting reports on crop conditions ~~from~~ selected non-officials in the rural areas on a voluntary basis was tried several years back but the proposal had to be given up due to inadequate response from the non-officials. It would be desirable ~~for~~ for the DES to get such reports on weather and crop conditions from each Block Agricultural Development Officer and the Chief Agricultural Development Officer at the district level ^{*} and on this basis prepare qualitative reports, to start with, which could be later developed into advance estimates of crop production in quantitative terms.

* The functions of Block Agricultural Development Officer and the Chief Agricultural Development Officer are explained in Chapter 62 on Agricultural Administration.

61.5.14 The possibility of developing advance estimates of crop production on the basis of biometric measurements of the crop during its growth is being studied by IARS through pilot investigations in respect of paddy, wheat, jute and cotton. The scope of these investigations should be extended to other crops; and the results utilized on a field scale as soon as the requisite techniques are evolved.

61.5.15 The pre-final estimates of crop production now issued by the DES also need improvement. The CIAS had suggested several improvements with regard to these and other aspects of improvement of statistics of area and production; we suggest that these recommendations should be pursued with the States. The CIAS should be activated and should meet more frequently, not only to consider the new proposals for improvement of agricultural statistics, but also to review action taken on its recommendations from time to time. The scope of the Committee should be widened to cover livestock, fisheries and forestry statistics as well.

61.5.16 Statistics of rainfall and other climatic factors are useful in statistics of crop production in several ways. These have been discussed in Chapter 13 on Climate and Agriculture.

Remote Sensing Techniques

61.5.17 New scientific techniques of remote sensing through artificial satellites are being tried in several countries for various purposes such as resource surveys, ~~post~~ surveillance, advance warnings on impending crop failure and even crop estimation. In India remote sensing through aerial photography is being tried in Anantapur District on an

experimental basis by the ICAR in collaboration with the Indian Space Research Organisation. Remote ~~sensing~~ refers to air-borne techniques designed to enable the gathering of information about relatively distant objects on or near earth's surface. It includes aerial photography, radar, thermal scanning, side-~~looking~~ radar and remote sensing by satellite. The most promising of the new developings is remote sensing by satellite under the Earth Resources Technological Satellite Programme (ERTS) of the United States. ERTS I orbits the earth at a height of 914 kms and its imagery is obtained by a mechanical scanner mounted in the satellite itself, signals being transmitted to observation stations. The satellite passes over the same ground area every 18 days and because of this an area can be monitored for changes over a period of time. Efficient use of remote sensing would include the services of satellite sensing, aerial photography and ground level observations which are in fact complementary. Results from ERTS indicate that satellite information can be applied to provide operational forecasts of crop areas. The measurement of crop growth is more difficulty. Further research and tests are needed before satellite data can be operationally tried. For example, anaylysis of the information provided by the remote sensing techniques can indicate for broad regions, the area under floods or the area over which sowings of crops have been delayed because of late onset of ~~monsoon~~. While experiments conducted so far have indicated that the technique can be employed for distinguishing between different crops grown on small fields, adequate experience is not yet available whether it can be adopted for estimating the area under each crop in a crop mixture or whether it could distinguish between crops like wheat and barley. Even if this is technically feasible, a question arises as to the cost of

such operations. It is doubtful whether there will be any significant cost advantage in adopting these techniques over the existing systems of crop enumeration adopted in India. The technique will no doubt be useful or perhaps the only one feasible in determining the land use of inaccessible areas. While we recognise the potentialities of the new techniques in pest surveillance, resource surveys, land use classification in inaccessible areas and in providing an early warning of impending crop failure on a broad regional basis, their use in crop estimation in replacement of the existing methods seems to be limited under Indian conditions. The DES should, however, keep in touch with developments in the field.

Situation and Outlook Reports

61.5.18 There is also need for preparing Situation and Outlook Reports in respect of principal crops not only for assisting the Government in its policy work, but such reports will be useful for the farmers, traders and manufacturers also. The information collected as part of the advance estimates can be utilized for preparing these situation and outlook reports. Further information regarding farmers intentions regarding cropping, use of fertilizers etc. can be collected through the All-India Comprehensive Cost of Cultivation Scheme, by prescribing separate returns for the purpose. The Situation and Outlook Reports may cover, apart from the area under crops, other aspects such as production, prices, market arrivals, trade, internal as well external and stocks. We feel that if properly prepared and issued in time such reports will be very useful for the Government as well as the public.

6 FRUITS AND VEGETABLES STATISTICS

61.6.1 Statistics of area under different fruits are now available at the all-India level from 1958 onwards for mangoes, citrus, banana, grapes, pome and other fruits among fresh fruit crops and cashewnut among dry fruits. In addition, estimates of area under papaya and banana and their production based on eye estimates are also published by the DES. Even though estimates of area under some of the fruit crops are available, reliable estimates of their production are lacking. The available data on production are mostly based on ad hoc surveys carried out by the IARS and the marketing surveys carried out by the Directorate of Marketing and Inspection (DMI). In the case of banana, crop-cutting surveys for estimation of yield and production are in vogue in the important growing areas of Maharashtra, Madhya Pradesh and Karnataka. The available data on area and production of fruits are published with a considerable time lag and in some cases the data do not cover all the principal States growing the crops.

61.6.2 So far as vegetable are concerned, separate figures of area are available for potato, tapioca, sweet potato, onion and all other fresh vegetables taken together. Estimates of production are available only for potato, sweet potato and tapioca. In the case of some States, yields of a few crops like tapioca, and potato are based on crop-cutting experiments conducted every year.

61.6.3 The problems involved in estimation of area under fruits were first considered by the ICCAS in 1949 which observed that "It is not possible to include area under scattered trees in the estimates of cropped area given in Agricultural

Statistics in India, as the land on which such trees stand is also covered by one or the other land use classification". Realising the difficulties in the collection of data relating to area and of different fruit crops, the IARS conducted a series of pilot investigations in typical districts of selected States with a view to evolving suitable sampling methodology for estimating the extent of cultivation, yield rates and production of fruit crops as well as to collect reliable data on the cultivation practices adopted. As a result of these investigations, the IARS evolved the requisite methodology, but it is not being adopted in many States as high priority has not been given to the collection of these statistics so very necessary for planning in horticulture. As a result adequate financial resources were not provided under the Plans.

Recording of Area under Fruits and Vegetables

61.6.4 We have carefully considered the problems of collection of statistics of area and production of fruits and vegetables and feel that the agricultural statistics authority in each State should, in consultation with the Director of Agriculture or Director of Horticulture, prepare a list of important fruits and vegetables grown in the State.

Arrangements should be made for collection of information regarding the area under each of the important crops in the normal agricultural statistics on the basis of complete enumeration done by the Patwaris. While recording the area under different fruit crops only the area under regular orchards should be accounted for. In the case of orchards having two or more types of fruit trees grown mixed in such a way that each single fruit crop occupies roughly more than

10 per cent of the area of the orchard, the area under the different crops should be roughly allocated in proportion to the number of trees and distance between the trees of the respective crops. In the orchards of bearing age growing inter or support crops, the entire area should be recorded both under the fruit crop as well as under the inter or support crop.

Census of Fruit Trees

61.6.5 In order to provide a sound basis for future planning, as well as supplying a reliable frame for conducting sample surveys for studying different aspects of fruit cultivation, a census of fruit trees which should include scattered trees also should be conducted once every five years throughout the country. The census should provide data relating to number of trees of different commercially important local fruit crops according to bearing and young categories as well as according to important varieties. The planning of the census, which should be conducted through the State agencies, as well as the compilation and analysis of data should be done by a Central agency. Uniformity of concepts and definitions should be ensured in conducting the census.

Estimation of Yield Rates

61.6.6 The methodology already evolved by the IARS for estimating the yield rates and production of fruits should be adopted by the States for undertaking sample *surveys* for one or two crops every year in rotation in accordance with an all-India programme. For vegetables, pilot investigations should be conducted by the States and IARS in important

vegetable growing areas. While conducting the surveys for estimation of area and production of fruits and vegetables uniform concepts and definitions should be adopted. The standard concepts and definitions are given in Appendix 61.6.

Market Intelligence

61.6.7 Data on wholesale and retail prices of fruits and vegetables and their market arrivals are very important for keeping a watch over the progress of their development. We recommend that in all the important city fruit markets whole-time staff should be posted to collect and report data on prices and arrivals. Ancillary data on cold storages, stocks, marketing practices and movement of fruits and vegetables by different modes of transportation i.e. by rail and road should also be collected at regular intervals.

Methodological Investigations

61.6.8 Many of the fruit trees are perennial crops and bear fruits after a period of a few years. In estimating the cost of production, the cost of cultivation upto the bearing stage has to be worked out and allocated to the crops during the subsequent years. Further in each orchard there will be mixture of young and **fruit** bearing trees. This presents problems of allocation of costs between the two. We, **therefore,** recommend that methodological investigations should be carried out to standardise the data collection techniques for estimating cost of production of fruits.

61.6.9 In the case of cashewnuts, a wide divergence is reported between the statistics published by the DES on the basis of data furnished by the States and those maintained by the Cashewnut Development Council. The discrepancy between

the two sets of figures should be reconciled. It is possible that part of the difference is due to the inclusion or exclusion of data regarding cashewnuts grown in forests. Similarly with regard to some of the fruit crops e.g. mango, the estimates given by the DMI are higher than those published by the DES. One of the possible reasons for the divergence is that while the former includes estimated area covered by the scattered trees alongside canal banks, roads etc., the latter figures relate to orchards only.

Organisational Arrangements

61.6.10 A separate Unit should be set up in the DES to coordinate the data on fruits and vegetables collected by the State Departments and to bring about improvements in the data collection techniques from time to time. Research in the improvement of methodology should be conducted by the IARS. A statistics unit should be set up in the Institute of Horticultural Research at Hessarghata which could maintain all the relevant data for use in the work of the institute. In the States where separate Horticulture Departments have been established, statistical units should be set up in the departments for looking after the work of statistics fruits and vegetables. In other States, this work should be entrusted to a separate unit in the agricultural statistics sections.

Statistics of Processed Fruits and Vegetables

61.6.11 Statistics of processed fruits and vegetables are also required for planning the programmes for expansion of the industry and for keeping a watch on its progress. Data on the processed fruits and vegetables should be collected as part of the Annual Survey of Industries. Information is needed

regarding the item-wise capacity and actual production during different periods of the year, availability of processed fruits and vegetable products for internal consumption and exports and utilisation of raw materials.

7 IRRIGATION STATISTICS

Concepts and Definitions

61.7.1 Statistics of irrigation comprise mainly data on area irrigated by different sources and that under crops irrigated. Two types of irrigated area can be distinguished-net and gross. The net irrigated area is the area irrigated during an agricultural year (July-June) counting the area only once even if two or more crops are irrigated in different seasons on the same land. Gross irrigated area is the total irrigated area under various crops during a year, counting the area irrigated under more than one crop during the same year as many times as the number of crops grown, crops sown mixed being taken as one crop. From this it follows that area irrigated more than once is obtained by deducting net area irrigated from gross area irrigated. Moreover, irrigated area is the cropped area to which water has been applied at least once in a season irrespective of whether the irrigation is adequate, inadequate or in excess of requirement. The irrigated area does not, thus take into account the depth or the frequency of watering.

61.7.2 With regard to the concepts of irrigation, the gross command area is the total area covered by an irrigation project including unculturable area under habitation, roads, banks, barren and wastelands etc. The culturable commanded area is the gross area commanded less the area of unculturable land included in the gross area. The irrigation potential of a project is expressed in terms of the gross area that is irrigable with the amount of water available and under the cropping pattern envisaged for the project. The utilisation

is the gross area actually irrigated each year. The ratio between the actual irrigation and the potential is termed as 'utilisation ratio'.

61.7.3 For a meaningful analysis of the benefits of irrigation, certain other ratios are also important. These are crop irrigation ratio, net and gross irrigation ratio, intensity of irrigated cropping and that of irrigation. The crop irrigation ratio is the ratio of area irrigated under the crop to the total area under the same crop expressed as a percentage. The net irrigation ratio is the ratio of area irrigated to net area sown in a year expressed as a percentage, while the gross irrigated ratio is the corresponding ratio between the gross area irrigated and gross cropped area in a year. The intensity of irrigated cropping is the ratio of gross area irrigated to net area irrigated expressed as a percentage, while intensity of irrigation is the sum total of the areas irrigated under different crops in a year expressed as a percentage of culturable command area of a project. These definitions should be adopted uniformly.

Sources of Irrigation Statistics

61.7.4 The three main sources of irrigation statistics are: (i) Land Utilisation Statistics (LUS) compiled as part of Indian Agricultural Statistics brought out by the DES and the State Season & Crop Reports (Annual), (ii) Annual Administration Reports of the State Irrigation Departments, and (iii) periodical progress reports compiled by the Planning Commission, Ministry of Agriculture and Irrigation and the State Departments concerned with irrigation schemes. Besides these main sources, data on irrigation are also

available through the periodical reports prepared by the Central Water Commission on major and medium projects and various assessment and evaluation reports brought out by different organisations from time to time on the basis of sample surveys and other investigations.

Methods of Collection

61.7.5 The methods of collection of irrigation statistics are basically the same as those of other land use and crop area statistics of which they are a part. During the crop inspection, the Patwari records the area irrigated during the crop season and the source of irrigation in the relevant columns of the Khasra. When West Bengal, Orissa and Kerala also adopt complete enumeration, as recommended in paragraph 61.2.8, uniformity in the methods of collection all over the country can be ensured.

Defects in Statistics

61.7.6 The main defects in the irrigation statistics are: (a) timelag in their availability, (b) lack of uniformity in concepts and definitions of terms like 'irrigation potential' and 'irrigation intensity', (c) discrepancy between the data based on LUS and those derived from the progress reports, and (d) their inadequacy to meet the requirements of planning and evaluation of progress. We have gone into the question of concepts and definitions and have indicated our proposals in Appendix 61.7. We commend these for uniform adoption.

61.7.7 As mentioned earlier, the major defect in irrigation statistics is the wide discrepancy between those based on LUS and progress reports. For example, the gross irrigated area in the Indian Union went up from 22.6 Mha in 1950-51 to

38.6 Mha in 1971-72. On the other hand, the additional area receiving irrigation benefits during the successive Plans is as under:

	Major and medium <u>irrigation</u>	Minor irrigation <u> </u>	(Mha) Total <u> </u>
First Plan	1.30	3.80	5.10
Second Plan	2.20	3.60	5.80
Third Plan	2.20	5.30	7.50
1966-67 to) 1968-69)	1.45	4.00	5.45
1969-70	0.46	1.32	1.78
1970-71	<u>0.45</u>	<u>1.57</u>	<u>2.02</u>
	<u>8.06</u>	<u>19.59</u>	<u>27.65</u>

The difference between the two figures is large.

An attempt at the reconciliation of these two sets of figures was made, and since 1968-69, there has been an improvement and the discrepancy has become comparatively small. This can be seen from the fact that for the year 1968-69 while the LUS gives the gross irrigated areas of 35.4 Mha, the Planning Commission (Draft Fifth Plan) gives it as 36.0 Mha. Some of the steps taken, which have reduced this discrepancy are:

- i) In the figures of additional area benefited by minor irrigation, old irrigated area over which irrigation had been made more certain, the area benefited by water conservation-cum-ground water recharge schemes and the area protected by drainage, flood control, etc. were included. Now these have been excluded since the beginning of the Fourth Plan.

- ii) In some of the southern States, major irrigation projects which improved the irrigation facilities in areas which were already being irrigated through minor irrigation tanks, etc., were also included in the new area irrigated. These have also been now excluded since the beginning of the Fourth Plan.
- iii) In the minor irrigation figures there was some over-estimation on account of the higher yardsticks for different categories of works, like wells, pumpsets, etc. adopted in the progress reports. These have now been rationalised on the basis of sample surveys.
- iv) Some of the minor irrigation works went out of use, but this area was not deducted when compiling total cumulative irrigated area in progress reports. This is now being done although there is need to further improve the estimates of depreciation on this account.

61.7.8 Some of the other steps which still need to be taken in order to reduce the difference between the figures of irrigated area according to LUS and the progress reports are:

- i) While in the case of the major and medium irrigation projects, cognizance is taken of the fact that there is a time-lag between the creation of irrigation potential and its utilisation, in the case of the minor irrigation schemes, hundred per cent utilisation is assumed as soon as the irrigation potential has been created. Surveys in Madhya Pradesh and ~~some~~ ^{some} other States have indicated that this is not correct and as such utilisation figures for minor irrigation works should also be separately estimated on the basis of actual recording or sample surveys, etc. It is also known that in the present circumstances, all the shallow tubewells and pumpsets installed for use of ground water are not being fully utilised since the number of hours run are comparatively small. Thus, although the potential for pumping out water is there, yet the utilisation is rather low. The utilisation could also be low due to lack of power or non-availability of diesel at certain times from year to year.

- ii) Quite a large number of tubewells and wells are now being constructed within the command areas of existing major and medium irrigation works to provide either supplementary irrigation or to provide irrigation to additional cropped area within the command. The supplementary irrigation figures should not be added or included in the normal irrigated areas as these areas have already been included in the benefits of major and medium irrigation works.
- iii) When major and medium works, replace certain areas of minor irrigation works, no deduction of areas under minor irrigation is made at present. It is suggested that this should be ascertained and correction made.
- iv) Because of intermixing of irrigation facilities in the area, through surface water from major and medium irrigation works and ground water through private minor irrigation works, it becomes difficult to apportion the area irrigated sourcewise, sometime resulting in duplication while reporting progress. A suggestion with regard to this is indicated later.

61.7.9 In view of the above, we recommend that the reconciliation of the two sets of figures should be done at the district level where the statistics reported in the LUS could be checked up with the corresponding figures of additional irrigation benefits from the different schemes. We suggest that this should be one of the functions of the Planning Unit proposed to be set up at the district level.

Suggestions for Revised Classification

61.7.10 The sources of irrigation for which separate data on area irrigated are available are; (i) government canals, (ii) private canals, (iii) tanks, (iv) tubewells, (v) other wells, and (vi) other sources. This classification does not indicate separately irrigation from major, medium and minor sources and from surface and ground water sources. We recommend the adoption of a more rational classification of

the sources of irrigation into the following:

I. Surface Water

Public surface water flow irrigation projects

i) tanks

(a) large
(b) small

ii) major & medium

iii) minor

Public surface water lift **irrigation** projects

i) major & medium

ii) minor

Private surface water irrigation works

i) flow irrigation

ii) lift irrigation

II. Groundwater

i) public tubewells

ii) private tubewells

iii) dugwells.

Definitions of the above classes are given in Appendix 61.7

Other Improvements in Statistics

61.7.11 For taking a forward view of the development of irrigation and also for drawing up programmes for its optimum utilisation, it is not enough to obtain data regarding area irrigated from each source. What is necessary is to have the information whether the water is available perennially throughout the year or upto February or ~~December~~. As noted in paragraph 61.7.1 the irrigated area relates to area on which water from any source is applied even once irrespective of whether it is adequate or not. Perennial water supply would enable two or more crops being grown on the same land but in

most of the diversion schemes, water is available upto December or February. In the absence of information regarding the period of the availability of water, meaningful programmes for multiple cropping cannot be drawn up, nor can crop rotations and cropping patterns appropriate to different agro-climatic regions be determined. It is not necessary nor desirable to burden the normal agricultural statistics system with the collection of this information on an annual basis. But it should be possible to collect these data on a project basis, as part of Annual Administration Reports of the State Departments of Irrigation to which we have drawn attention later in this section.

61.7.12 Another inadequacy in the existing irrigation statistics is that source-wise break-up of gross irrigated area is not available; so also the break-up of the total irrigated area classified according to major, medium and minor irrigation schemes is not available. On a proposal made by the Ministry of Agriculture and Irrigation, the State Governments have agreed to collect this information.

61.7.13 Although many State Governments publish some information on the number of irrigation sources, namely, wells, tubewells, tanks, etc. in their Season and Crop Reports (annual), no complete information on the number and type of irrigation sources, particularly minor sources, is available on an all-India basis. The basic data for compiling this information at the all-India level is available in the basic land records in some States. What is necessary is to undertake its compilation in other States and also to conduct special surveys to update the information once in

five years. We, therefore, recommend that a census of irrigation sources should be undertaken along with the agricultural census referred to in section 13 and information on the number of **public tubewells** private tubewells, dugwells, pumpsets and other irrigation sources, be compiled and published once in five years.

61.7.14 Some States like Karnataka and Madhya Pradesh have undertaken special surveys of irrigation sources and have compiled detailed information on the number of wells and their utilisation. Other States also might consider the desirability of undertaking such special surveys periodically.

61.7.15 At the all-India level, the area irrigated more than once is 7.0 million hectares or 22.2 per cent of net irrigated area, whereas the area sown more than once is 24.6 million hectares or 17.7 per cent of net area sown in 1971-72. There is a popular misconception that the difference between the two is all rainfed. This is not correct, for, this difference also includes area on which two crops are grown, one of which is irrigated and the other rainfed, the second crop being grown on the residual moisture or with the help of rainfall. This explains why in terms of percentages the two figures are close. If irrigation was not available on bulk of this area even in one season, perhaps it would not have been possible to raise more than one crop in such land. Of course,

there are areas which receive adequate rainfall to enable raising of two or more crops in a year without the aid of irrigation.

61.7.16 At present, for reporting the statistics of sourcewise irrigated area under LUS, only the main or major source of irrigation is generally taken into account in cases where a particular area **receives** irrigation from two sources in a season. Because of this, the figures of area irrigated by the minor source are under-estimated. Further, for the purpose of periodical progress reports on irrigation works, full benefits are reckoned even in case where only partial irrigation is provided by a source in any season. Part of the discrepancy between the two sets of irrigation data arises because of this. One way of handling the matter is to collect separate information relating to the area irrigated by more than one source - canal-tubewell, canal-well etc. The figures would thus have to be collected for -

- i) total area irrigated by public and private surface water projects including area under (iii),
- ii) total groundwater irrigated area including area under (iii); and
- iii) portion of the total area irrigated by public and private surface water projects which has received supplemental irrigation **from** groundwater.

Item (iii) would give information regarding the area making conjunctive use of surface and ground water, but it will not give a relative quantitative estimate of surface and ground water thus used. For making that assessment periodical sample surveys would be necessary. In working out the figures for total irrigated area those for item (iii) will have to be subtracted from the sum total of (i) and (ii). In the field, figures for (iii) should be recorded by the agency recording (ii).

61.7.17 There is scope for improving the statistical coverage of the annual Administration Reports prepared by the Irrigation Departments. For example, information regarding the availability and status of water supply at the source of the irrigation systems, taking into account seasonal fluctuations, command areas and intensities of irrigation for which the projects are planned, the norms in regard to the duty of water or water allowances adopted in the design of the projects, and the cropping patterns for which the projects have been designed as well as the actual cropping patterns needs to be collected and published. We have given some specimen returns in Appendix 61.8 which the States should adopt. Where it is not possible to

collect some of the information through the prescribed returns (e.g. number of waterings and their intervals), periodical sample surveys should be conducted in the command areas of irrigation projects. We recommend that the Annual Administration Reports together with statistical data prescribed in the returns should be published immediately after the year is over. These data should also be consolidated at the all-India level and published every year.

Drainage Statistics

61.7.18 Although absence of drainage is a major problem in several areas of the country, no accurate data are available regarding the extent of the problem, which is acute particularly in the case of rice in coastal areas, and in the diara areas of the larger rivers. Two types of data are relevant in this connection. The first is area benefited by the drainage schemes. This information can be collected from the progress reports on the schemes. The second and more important is the enumeration of area for which drainage facilities are inadequate. Even at present in the preliminary crop-cutting returns, information is called for on the level of land, specially in the case of paddy. The fields are categorised

into high (or uplands), medium or low. This information can be tabulated once in five years, as proposed in Section 14 of this Chapter.

Organisational Set-up

61.7.19 We suggest that for handling the collection and analysis of irrigation statistics there should be appropriate statistical Units in the State Departments of Irrigation and there should be close coordination between this statistical unit and the Statistician in charge of agricultural statistics in the State. At the Centre, such coordination has been recently achieved in as much as that the Economic and Statistical Adviser to the Ministry of Agriculture and Irrigation would be in overall charge of the statistical matters of all the Departments in the Ministry.

8 LIVESTOCK STATISTICS

Current Status

61.8.1 The basic statistics in the sphere of animal husbandry comprise the data on number of different categories of livestock* their composition in terms of breeds, sex and age and the output of different livestock products and byproducts. The first census of cattle in British India was held during the winter season of 1919-20 and the second census was taken during the winter of 1924-25. It was subsequently felt that the period of enumeration, viz., December to April, adopted for the enumeration of cattle was too long and that the results were vitiated to some extent by inter-State movement of cattle during the period. The RCA also drew attention to this shortcoming and recommended simultaneous conduct of the livestock census throughout the country. The period of enumeration for the subsequent censuses until 1951 was one month viz. January. The scope, coverage and the classification of the livestock census were expanded for the 1951 census and attempts were made to ensure the adoption of uniform concepts and definitions. A single day was adopted as the reference period. Adequate attention was also paid to the problem of training of primary staff and supervision over their work. In fact, rationalised supervision over the work of the primary enumerators formed an integral part of the census operations. In addition, a post-enumeration sample verification of census results was also introduced in 1956. Information on additional items like age and breed composition, immunisation against rinderpest

* In this section, the term livestock includes poultry.

lactation period, calving interval were also collected by some States through the post-enumeration surveys.

61.8.2 The position with regard to the availability of statistics of livestock products such as milk, milk products, meat, eggs, wool, hides, skins, bones, bristles, animal casings and other products of animal origin is not satisfactory. No reliable estimates of cost of production of these products, which are a pre-requisite for assessing the economic viability of raising different types of livestock, are available. Till the late fifties, the only information available regarding the production of major livestock products, e.g. milk, eggs, wool and meat was from the marketing surveys carried out by the DMI at different points of time. As these surveys were not based on any objective methods of estimation, the data were found to be not quite reliable. The NSSO also collected information on the quantity and value of livestock products in some of their socio-economic rounds. The estimates thrown up by these surveys were of limited utility as the information was collected by the interview method and the results were not satisfactory.

61.8.3 Realising the need for securing precise and objective estimates of livestock production and also keeping in view the importance of collection of information on feeding and management practices of cattle, buffaloes, poultry, sheep, etc., the IARS carried out methodological studies with a view to determining the sampling techniques to be adopted for surveys in the field. The main features of the survey methodology developed were: (a) adequately large and

representative samples, (b) operation of the survey throughout the year to permit seasonal variations to be studied and averaged out in building up annual estimates, and (c) objective methods of collection of data on such items as milk and feed by direct weighment. Using the methodology arrived at as a result of such pilot investigations, large scale sample surveys were carried out in several States and on the basis of these surveys objective estimates of production of milk, wool and eggs were framed in 1966 at the all-India level. Subsequently though some of the States did carry out sample surveys for estimation of one or more of the livestock products, these were not carried out on a regular basis in all the States and as such, it was not possible to build up reliable all-India estimates for any of these livestock products.

61.8.4 Apart from the basic data on numbers of livestock and output, a lot of useful information is being collected on the developmental aspects of animal husbandry programmes. For example, under the Intensive Cattle Development Projects (ICDP) data on artificial inseminations carried out and incidence of disease are collected through periodical progress reports. In the ICDP areas bench mark and repeat surveys have been carried out by some States to provide information on the progress of the projects. Data on market prices of livestock products are also being collected. In some States, systematic milk recording of selected animals in key village blocks and other areas falling under the cattle development projects has been taken up. Some of these data are published in the administrative reports of the State Animal Husbandry Departments. In addition, ad-hoc surveys on cost of production of milk and impact of milk

supply schemes on the rural economy were carried out in some States to meet their specific needs. Information regarding slaughter of animals in recognised slaughter houses, inter-State movement of animals by rail and imports and exports of livestock and livestock products is also being collected regularly.

Improvements in Livestock Census

61.8.5 We have noted that the quinquennial livestock census which was due on April 15, 1971 could not be taken that year and was postponed to April 15, 1972 and even then the census could not be taken uniformly in all the States at that point of time. It had to be postponed to September, 1972 in Himachal Pradesh and November 1972 in Jammu & Kashmir, Karnataka and Meghalaya. In Tamil Nadu the census was taken with March 1, 1974 as the reference date. Consequently, the census results were available at the all-India level only in November, 1974. It is important that the census should be undertaken simultaneously in all the States and Union Territories and that arrangements should be streamlined in such a way that the consolidated results are published with a minimum time-lag. Further, the practice of having a post-enumeration check by an independent statistical agency in addition to the rationalised supervision by State agencies should be revived. Information to be collected in the livestock census on complete-enumeration basis should be confined only to the major items and classifications. Additional details should be covered through sample surveys. This would enable speedier tabulation and hence quicker availability of the census results. For example,

while the complete-enumeration census may be confined to the classification of cattle and other livestock into broad use-classes, further details regarding the breeds etc. should be obtained through the sample surveys. We also suggest that the census of fishing crafts and tackle may be separated from the livestock census, while the agency for the collection of data at the village level may remain the same.

61.8.6 A definite schedule for reporting and consolidation of census data at different levels should be laid down. State reports and the all-India report giving the estimates of livestock population should be available within one year of the completion of the census. Advance tabulation of a ten per cent sample of the livestock households in respect of the more important items in the list should also be undertaken in the interest of bringing out advance reports on the census results within a few months of its completion.

61.8.7 The average life of an animal varies from species to species and in many species the useful life of an animal is limited. A question has been raised whether in view of this, the frequency of the periodical livestock censuses should be increased and the inter-census interval decreased and whether **an annual census is necessary.** We feel that while it is absolutely essential to have reliable information on the numbers of livestock every year, it will not be necessary to conduct a livestock census every year on all-India scale. This information can be collected through integrated sample surveys discussed under the next sub-section.

Improvements in Livestock Products Statistics

61.8.8 Although fairly detailed information on the numbers of livestock based on livestock census is available once in

five years, similar reliable information on the output of livestock products is not yet available, on a systematic basis. Once the methodology was developed, it was thought that the State Governments would adopt the techniques and carry out regular surveys for estimating the livestock products leading to the all-India estimates. However, collection of statistics is not being given the high priority that it deserves in the allocation of financial resources for such schemes under the five year plans.

61.8.9 Unlike crop yields which ~~are~~ harvested at specified points of time in a year, milk and eggs are obtained almost every day and in the case of milk at different times in the same day. Thus, estimation of yield of milk and eggs has posed certain methodological problems in organising sample surveys. As these have now been resolved, the State Governments should give the highest priority to organising sample surveys for obtaining reliable estimates of production of milk and other livestock products, which are essential for scientific planning for development as also for assessing the overall progress.

Integrated Surveys

61.8.10 The IARS has been engaged in evolving a suitable design for undertaking integrated surveys for obtaining estimates of output of livestock products and numbers of various categories of livestock spreadover a period of five years. The intention is that every year one main livestock product should be selected and studied ~~suffi~~ sufficiently intensively so that reliable information on the number of animals and the output of that product together with

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related information on feeding and other animal husbandry practices associated with that species is collected. In the other years, only indices of change in the numbers and output in relation to the base year are worked out. However, so far no report has been brought out by the IARS on these surveys. We feel that the concept of integrated survey is sound in principle and that the methodology should be finalized quickly. Till then, sample surveys for different livestock products should be continued. With the setting up of statistical units in the Animal Husbandry Departments of all the States, it should be possible to extend these surveys to all the States and all the livestock products. We also recommend that the system of periodical release of all India and State estimates of livestock products should be introduced, as soon as practicable. The details of the timing of these estimates and their scope and coverage should be worked out. It is also noted that the Thirtieth Round of the NSS which started in July 75 is devoted to the estimation of livestock products and to the study of the economics of livestock enterprise.

Improvements in Other Data

61.8.11 As already mentioned, data on improved breeds of livestock and poultry should also be collected through sample surveys on a systematic basis. Various types of other statistics related to the livestock economy are needed to meet the present day requirements of planning for livestock development. The periodicity of their collection and the methodology to be adopted depend on the nature and magnitude of the variation in the items. For example, while data on livestock numbers should continue to be collected on a

complete enumeration basis once in five years, data on variations in numbers should be collected through annual sample surveys. Data on wholesale and retail prices of livestock, livestock products and livestock feed and fodder should be collected at selected centres on a weekly basis. These would be useful in more objective evaluation of the value of output from the animal husbandry sector. Information regarding market arrivals of major livestock products should be collected at weekly intervals. Data on production of livestock feed including cattle, poultry and other feeds should be collected from the major units producing these feeds on a monthly basis. Data on fodder should be collected on a seasonal or annual basis. With the rapid development of processing of livestock products, the methods of marketing and the proportions of livestock products converted into various indigenous products such as butter, ghee, cheese etc. are also changing. The DMI should carry out fresh marketing surveys to collect upto date information in respect of these items.

61.8.12 Monitoring and evaluation of development programmes

A number of development programmes are being implemented for increasing the production and availability of livestock products. For assessing the progress of programmes at various stages of implementation as well as measuring the impact of these programmes, data on indicators of various activities should be systematically collected, processed and analysed. For instance, in the field of cattle development programmes, the items of information should relate to the number of artificial inseminations carried out, number followed up,

number found successful, number of cross-bred calves born, number of cross-bred cows in production, number of bulls castrated, number of vaccinations against rinderpest and foot and mouth disease etc. These data should be reported regularly by the development staff provided under the programmes and appropriately compiled and analysed. In addition statistical staff should undertake surveys for assessment and evaluation of different programmes.

61.8.13 Collection of data from dairy and other plants: With the organisation of dairy plants and improved arrangements for collection and processing of data, a lot of useful information could be collected in respect of these plants. For example information regarding the quantity of fresh milk procured and processed by the plants and prices paid can be collected on the basis of prescribed returns by each dairy plant. Similarly the amount of milk processed into different livestock products and their production can also be collected through prescribed returns. The livestock statistics unit in the Animal Husbandry Division of the Ministry of Agriculture and Irrigation should study the nature of data at present being maintained in the dairy plants for their own normal administrative purposes and prescribe standard proformas through which this information could be collected, compiled, tabulated and analysed at the State and all-India levels. As in the case of dairy plants, information should also be collected, compiled and processed in respect of plants handling other livestock products such as slaughter houses, bacon¹~~factories~~ poultry dressing plants, feed manufacturing plants, bone digesters, etc.

61.8.14 Collection of data through development staff: One of the reasons for the limited availability of data on animal husbandry hitherto was the non-availability of technical staff in the field. With the expansion of the animal husbandry and dairy development programmes, a large number of field staff with qualifications and experience in animal husbandry development are available in the field at different levels. It is necessary that information regarding the developmental aspects of animal husbandry programmes should be collected through this field staff. While it is not intended that the field staff should be burdened with a lot of paper work involved in the submission of progress reports, yet it would be possible to collect valuable data on the implementation of these programmes if these are reported regularly by the implementing agencies and are consolidated at successive levels. There is a feeling that the data reported by developmental agencies are likely to exaggerate the development work, but this tendency could be checked by greater supervision by the supervisory authorities at successive higher levels, supplemented by a small statistical staff engaged in planning, coordinating and compiling the data generated. For example, systematic milk recording needs to be introduced in all the key village blocks and in the ICDPs.

61.8.15 Quarterly district reports on livestock situation: There is need for developing a proper system of reporting detailed data on the livestock situation from the districts. In the context of planning, it will be useful to develop a system of reporting, on quarterly basis, the prevailing

conditions relating to season, climate, incidence of disease, availability of animal feed and fodder, price situation of livestock and livestock products etc. to the State headquarters.

Types of Data and Periodicity

61.8.16 The types of data to be collected, the level at which they are required, the periodicity and the mode of collection are given in the Table 61.2.

Table 61.2
Periodicity and Mode of Collection of Livestock Statistics

Type of statistics	Level at which required	Periodicity	Mode of collection
1	2	3	4
1.(a) livestock numbers			
(i) selected items	village and upwards	quinquennial	complete census
(ii) other items	district/ State	quinquennial	sample survey
(b) variations in numbers	State	annual	-do-
2. average yield and output of livestock products	district and State	season and annual	-do-
3. mortality among animals	district and State	monthly	prescribed return
4. consumption and utilisation of livestock products	district and State	season and annual	sample survey
5. wholesale and retail prices of	selected centres	weekly	prescribed return
(a) livestock			
(b) livestock products			
(c) components of livestock, feed and fodder			
6. market arrivals of major livestock products	selected centres	weekly	prescribed return

1	2	3	4
7. trade in livestock and products	State	monthly	prescribed return
8. dairy plants			
(a) capacity and average throughput	unit-wise	annual/ monthly	-do-
(b) procurement/sale price	unit-wise	annual/ monthly	-do-
(c) utilisation of milk	unit-wise	annual/ monthly	-do-
9. slaughter houses	unit-wise	annual/ monthly	-do-
10. production of livestock feed for cattle, poultry and other	unit-wise	monthly	-do-
11. production of fodder	district and State	season and annual	sample survey
12. cost of production of livestock products and indices	region	annual	-do-
13. assessment and evaluation of development programmes	project-wise	annual	-do-
14 report on condition of livestock situation	district	quarterly	prescribed return
15. economic and technical data on livestock economy		ad-hoc	sample survey
16. data needed for cattle insurance	district	periodical	special studies

Organisational Set-up

61.8.17 The collection of comprehensive data is possible only when a proper organisational set-up is established from the district to the State and all-India levels. At the district level, the District Animal Husbandry Officer should have the help of requisite computational and other staff to help him

in the collection, compilation and submission of various types of animal husbandry, dairying and animal health statistics. At the State level, the Director of Animal Husbandry should have a full-fledged statistical division to serve the requirements of data on various facets of livestock economy for proper planning, execution of plans and appraisal of development programmes. This division should also be responsible for collection, compilation, analysis and dissemination of all animal husbandry statistics. During the last decade or so, statistical cells have been set up in many of the State Animal Husbandry and Dairy Departments. However, due to lack of appreciation of the importance of these data, these units could not be developed fully as adequate financial support was not made available for their development in the successive five year plans. It is important that each State should have a fairly senior statistician not below the rank of a Joint Director of Animal Husbandry attached to the Directorate of Animal Husbandry. The division should consist of the three units, viz. assessment unit, analytical unit and livestock census unit, for undertaking large scale sample bench-mark and assessment surveys of development projects, surveys on cost of production of livestock products, analysis of breeding data, progeny testing, sire evaluation, operational research, planning of livestock census, publication and dissemination of livestock data etc. Each of these units should be under the charge of a professional statistician of a suitable rank. The statisticians in the Directorate of Animal Husbandry should be in the general line of promotion in the field of statistics in the State. For economic analysis of the various projects and for undertaking

evaluation studies in the State, an economist of a suitable rank should also be provided in the division. The major dairy plants should also have economists on their staff to render advice on the pattern of **rational conversion of milk** into various products.

61.8.18 At the Central level, the statistical work should continue to be coordinated by the Statistical Unit in the Animal Husbandry Division in the Ministry of Agriculture and Irrigation which should be considerably strengthened. For undertaking evaluation and cost-benefit studies and **for** economic analysis of various projects, an economist of Joint Director level should also be provided in this Unit. The officer in charge of this Unit should be of the rank of Additional Economic and Statistical Adviser.

61.8.19 The units at the Central and State levels should continue to be under the administrative control of the Animal Husbandry Commissioner or the Director of Animal Husbandry as the case may be, but in technical matters their work should be supervised by the Economic and Statistical Adviser in the Ministry of Agriculture and Irrigation at the Centre and the State Agricultural Statistician in the States.

61.8.20 When the integrated and other sample surveys for providing inter-census estimates of livestock numbers, estimation of production of various livestock products including by-products, cost of production studies, etc., are conducted, new problems both methodological and others, will arise from time to time. There should be provision for undertaking methodological research and pilot investigations. This work should continue to be done at the

Centre by the IARS. Similar methodological studies should also be taken up by agricultural universities with financial assistance from the Centre.

9 FISHERIES STATISTICS

Current Status

61.9.1 India has a vast coastline of 5,600 km with varying extent of continental shelf. Inland fisheries resources covering both fresh and brackish waters extend over 9.6 Mha and are in the form of long rivers, big lakes, reservoirs, estuaries, tanks, canals, swamps and ponds. However, there is no precise estimate of potential resources of marine, inland and estuarine fisheries. With regard to inland and estuarine fisheries, reliable figures of estimated annual catches even are not available. However, for marine fisheries, all-India estimates of production with their State-wise break-up are collected by the Central Marine Fisheries Research Institute (CMFRI) through a sample survey. Some of the States also conduct sample surveys to estimate the marine fish catches. As regard inland fish production the only data available, prior to 1961, were those based on the marketing surveys undertaken by the Directorate of Marketing and Inspection (DMI). After 1961, States are furnishing some information, though not reliable, on the estimated catches of inland fish based on the quantities of fry and fingerling distributed, amounts of lease money realised, quantities marketed and other factors.

61.9.2 Data on number of fishing crafts and tackle were collected on complete enumeration basis as part of all-India livestock censuses carried out in 1966 and 1972. Information was collected on mechanised boats, non-mechanised crafts and fishing gears. The details of classification adopted for

the 1972 livestock census are given in Appendix 61.9.

Marine Fish Catches

61.9.3 The CMFRI, obtains data regarding total landings of marine fish by mechanised and non-mechanised boats and their variety-wise composition for each maritime State, the total effort in terms of man-hours spent on fishing, the number of units operated and the size composition of the landings in respect of selected species, on the basis of sample surveys. In the case of landing by trawlers, the information on catches is obtained through complete enumeration. The survey provides Statewise estimates of catches of fish for each month. The sampling error of the estimate of production based on the survey is as high as 4 to 5 per cent, even at the all-India level. The estimates worked out by the States on the basis of independent sample surveys and those obtained from the sample survey carried out by the CMFRI differ considerably. There is need for reconciling the differences between the two sets of figures. As long as the two surveys are carried out independently, the discrepancies are bound to persist. We would, therefore, suggest that the Fisheries Division in the Ministry of Agriculture and Irrigation and the representatives of the CMFRI, the concerned State Governments, IARS and the NSSO should get together and discuss the possibilities of having an integrated sample survey. The design of the sample should be so drawn up as to provide annual all-India estimates with a reasonable degree of precision, say, 2 per cent. The primary enumerating staff for conducting these investigations may belong to

the State Departments of Fisheries. In addition to the State supervision, statistical staff of the CMFRI could be used to supervise the sample surveys conducted by the States. The CMFRI staff could also collect biometric data in which the CMFRI is interested. Such an integrated scheme would, besides improving the reliability of the data, also avoid a situation in which the Centre and States give two different sets of figures.

Inland Fish Production

61.9.4 With regard to inland fisheries, we understand that the NSSO is undertaking pilot investigations with a view to evolving appropriate methodology. In 1962-63, the Directorate of National Sample Survey conducted pilot surveys in three districts of Orissa, viz., Cuttack, Mayurbhanj and Sambalpur, for estimating the fish catches from impounded waters like ponds, tanks, swamps, etc. Based on the experience gained in that survey, the NSSO have initiated integrated pilot surveys in Murshidabad district in West Bengal, Karimnagar in Andhra Pradesh and Madurai in Tamil Nadu. The surveys cover (a) estimation of water areas of tanks, ponds, rivers, canals and reservoirs, (b) estimation of fish catches per hectare of water area both by enquiry and by direct physical observation, (c) household fish consumption, and (d) fish marketing including volume of sales, sources and supply of fish in wholesale stalls. The output from both capture and culture fishing in inland waters is bound to increase in the light of measures discussed in Chapter 37 on Inland Fisheries and Aquaculture. It is

important to have reliable estimates of production of inland fish and the evolution of appropriate scientific methods is an essential prerequisite. We recommend that the pilot investigations including the estimation of the catches from captive fishery resources should be completed early and appropriate methodology should be made available to State Governments for implementation.

Integrated Programme

61.9.5 The Technical Committee on Coordination of Fisheries Statistics (1950) recommended an integrated programme of statistical work for organizing the collection of statistics both for administrative purposes as well as for planning the future development of Indian fisheries. Very little action was, however, taken on the recommendations of this Committee which are valid even today after a lapse of twenty five years. There are still a large number of gaps in the coverage of fisheries statistics and no headway has been made in effecting improvements therein. We recommend the collection of the following types of statistics at intervals noted against each:

i) <u>basic statistics</u>	<u>periodicity</u>
(a) fishermen population	decennial
(b) fishing crafts, tackle nets (gears)	quinquennial
(c) inland water resources (marine/inland)	quinquennial
(d) biological and research statistics.	periodical
(e) fish production- marine and inland (species-wise & gear-wise)	monthly

ii) <u>ancillary statistics</u>	<u>periodicity</u>
(a) prices (producer's price at first transaction, wholesale and retail prices)	weekly
(b) market arrivals and sources of supply	weekly
(c) utilisation of fish catch	monthly
(d) household consumption	periodical
(e) trade (external as well as internal)	monthly
(f) mechanisation of boats	annual
(g) ice and cold storage and preservation plants (capacity etc.)	annual

Census of Fishing Crafts, Tackles and Nets

61.9.6 As already suggested in paragraph 61.8.5, census of fishing crafts, tackle and nets should be separated from the livestock census. This census should be conducted by the State Fisheries Departments under the overall technical guidance and control of the Statistical Unit in the Fisheries Division of the Ministry of Agriculture and Irrigation.

The agency of Patwaris, etc should be utilised for field work, as in the case of the livestock census, after adequate training in concepts, definitions, etc.

Fisheries Resources

61.9.7 For planning the development of inland fisheries, it is necessary to have a critical assessment of the total inland fisheries resources available for development as well as those being exploited at present. The inland fisheries resources being biological in nature, are

continuously changing due to complex inter-relationship of various biotic and abiotic factors. It is, therefore, necessary to survey these resources periodically, specially with reference to geographical, physical, chemical and biological factors. The inland fish resources should be classified according to size of water area, depth, salinity, soil type, production potential, degree of utilisation, culture/capture practices, yield rates, etc.

61.9.8 With regard to marine fisheries resources, a continuous resources survey is necessary to collect information on various biological characteristics such as growth, recruitment, mortality, measurement of lengths, age determinants etc., Information on these basic parameters is important for the evaluation of yield from fishery under varying biological and environmental factors and for working out suitable population models for studying the dynamics of exploitation. It is also necessary to prepare an upto date inventory of all marine resources such as length of coastline, area of continental shelf, number of marine villages, number of active fishermen, etc. Such a survey should be conducted at least once in five years by the CMFRI with the help of the State Governments. Data on number of fishermen is already being collected through the population census once in ten years.

Mechanisation of Boats

61.9.9 Every year a number of mechanised boats are introduced for marine fishing. While new boats are introduced, some of the existing boats go out of use each year. A mere periodical census as on a day might not bring

to light the exact number of boats etc. available even in the census year. It would be desirable to have a registration of small mechanised boats of size below 25 gross registered tonnage (GRT). This would be useful not only from the point of maintaining statistics but also for keeping a watch on the growth of mechanisation.

61.9.10 With regard to larger vessels above 25 GRT, even now, in the course of their operation lot of information relating to operational details and performance of the vessels, specially in the context of commercial fishing becomes available; but it is necessary to collect and analyse these data systematically for working out the economics of deep-sea fishing and for demonstrating its potentialities.

Seed Fish Statistics

61.9.11 Statistics of seed fish were till recently not collected in an organised manner by most of the States. The Fish Seed Committee (1963) gave some idea of production of spawn, fry and fingerlings for 1964-65. For subsequent years, the States have been collecting the required data, though their coverage has been found to be incomplete. As the State Departments of Fisheries broadly know the centres for production of spawn, fry and fingerlings, both private and departmental, they should collect reliable estimates of seed fish available for further development. It is also necessary to develop appropriate technical coefficients such as mortality at various stages of fish growth, etc.

Prices, Market Arrivals and Other Statistics

61.9.12 Adequate arrangements are also necessary for collecting data on producers', wholesale and retail prices

of different categories of fish. Difficulties of specification of price quotation are likely to arise, particularly as the price of fish depends upon the variety, the size, the consumer preference and the state of freshness of the fish. It becomes sometimes difficult to apply the concept of **modal** price to transactions in fish. What is, however, important is to see that reliable data on prices of fish are collected for standard varieties and pre-determined specifications. With regard to market arrivals, it is suggested that, as a first step, arrangements should be made with the municipalities and municipal corporations for collection of data on market arrivals of fish on a periodical basis. Similar information should also be collected on the quantities of fish stored in cold storage etc. Data on utilisation of fish and also processing need to be collected at periodical intervals.

61.9.13 There is also scope and need for compiling derived statistics such as index numbers of production of fish and of prices. Once reliable data on production, prices and inputs are available, it should be possible to work out the contribution of fisheries sector to the national income more accurately.

Trade Statistics

61.9.14 Statistics of foreign trade in fish and fishery products are published as part of the general import/export trade by the Ministry of Commerce. But one important gap in the available data is the absence of information regarding unit value realisation of marine products exported from India. Marine Products Export Development Authority should undertake an analysis of the unit value realised by the various items from India in important foreign markets along with the

corresponding unit values realised for similar products by other countries. This analysis will be helpful in exploring the possibilities of diversification of exports of marine products.

61.9.15 Efforts should be made to collect statistics of internal trade and movements covering rail, river and road-borne traffic. As proper arrangements for refrigerated transport are essential for a perishable commodity like fish, data on internal trade and movements are important.

Other Data

61.9.16 Periodical evaluation of the various fisheries projects at the Central and State levels is necessary to provide guidance on the formulation and implementation of the development programmes. Another important data requirement is in respect of cost of production of fish. Appropriate methodology has to be developed for this purpose.

Organisational Set-up

61.9.17 For proper development of fisheries statistics on the lines indicated in the foregoing paragraphs, it is necessary to set up suitable organisations or strengthen the existing ones for the collection, compilation and analysis of data at different levels. Very few States have full-fledged statistical units in the Fisheries Departments to look after the collection and compilation of fisheries statistics. We, therefore, recommend that every State should have a strong Statistical Unit in the Fisheries Department manned by properly qualified statisticians and other statistical personnel, to deal with all aspects of fisheries statistics. At the Central level, the Fisheries Statistics

Unit, located in the Fisheries Division should be strengthened and placed under a Joint Director, who should work in close collaboration with the DES. For economic analysis of the various projects and undertaking evaluation studies an economist should be added to the Fisheries Statistics Unit at the Central and State levels.

61.9.18 The Central fisheries institutes like the CMFRI, CIFRI and CIFT have regular statistical units for the collection and interpretation of statistical data. With increasing emphasis on research data for proper evaluation and assessment of potential of inland and marine resources and progress of their exploitation, these units will have to undertake larger responsibilities. They should, therefore, be suitably strengthened with qualified staff at various levels. For the work of economic evaluation in the field of fish culture, fishing practices, as also the economic suitability of various types of engines, crafts and gears, the assistance of economists should be provided to the statistical units in these institutes.

10 FORESTRY STATISTICS

Scope

61.10.1 Collection of forestry statistics was initiated to meet the administrative needs of the Forest Departments and was largely a byproduct of administrative reports of the Forest Departments of States. Upto 1946-47, data on a small number of items of forestry were collected and published in respect of the British India alone. After Independence, with the integration of the Princely States, the coverage of the statistics was gradually extended to the forests located in the former Princely States also.

61.10.2 The principal forest statistics relate to area under forests, volume of standing timber and firewood, quantity and value of outturn of timber, firewood, and minor forest produce, employment in forestry and forest industries, foreign trade and data on revenue and expenditure. Miscellaneous information on the progress of working plans, breaches of forest rules and grazing of cattle in government forests is also collected. The scope of the forest statistics has been expanded since 1958-59 to include data on area afforested and deforested, area surveyed, classification of forests by management status, silvicultural system and density, outturn of logs and sleepers, and wholesale prices of forest produce. These data which are collected through the State Departments of Forests are compiled and published at the Centre by the DES which maintains close liaison with the Inspector General of Forests. The Central Forestry Commission which was set up in 1965, collects data on certain aspects of forestry such

as area under forests by ownership, legal status, composition, outturn of forest produce etc. in standardised forms referred to in Chapter 46 on Forest Planning, Research and Education. It also collects information on a few additional items required for planning in forestry.

Defects

61.10.3 Even today the available data do not fully meet the needs of planning. There is considerable timelag in the availability of forest statistics and complete information is not available in respect of forests under other civil authorities corporate bodies and private individuals. There is also a large discrepancy between the area under forests as published in ~~India Forest Statistics~~ and the figures published in Indian Forest Statistics and the figures published in India Agricultural Statistics. There is also need for enlarging the scope of the forest statistics.

Reconciliation of Discrepancy

61.10.4 As already mentioned in paragraph 61.2.10, LUS also provides data on area under forests. According to LUS, the total area under forests in 1970-71 is 66.0 Mha. The area as reported in Indian Forest Statistics aggregate to 74.8 Mha. There is thus a wide difference of 8.8 Mha between the two sets of figures. The differences are large in some of the States and are in either direction as will be seen from Appendix 61.10. The question of reconciling the discrepancy between the two sets of figures has been receiving attention in the Ministry of Agriculture and Irrigation for quite a long time. At one time it was thought that the major part of the difference between the

two sets of figures was due to differences in the definitions adopted for the two types of data. According to the CIAS, the recommended definition for forest is as follows:-

"Area under forests includes all lands classed as forests in any legal enactment dealing with forests and administered as forests irrespective of whether these are State-owned or private and whether wooded or managed as potential forest land".

Uniform adoption of the definition for both LUS and forest statistics does not eliminate completely the sources of discrepancy between the two sets of figures. It is necessary **that at the State level, the Chief Conservator of Forests** and the crop reporting authority should get together and take steps to eliminate the differences. Clear-cut procedures should be laid down for updating of the records every year and publication of one set of figures by both the agencies. Perhaps, the reconciliation has to be attempted at the district level between the divisional Forest Officer and the officer in charge of agricultural statistics at the district level.

Classification

61.10.5 Detailed data on the area under 'coniferous' or soft wood and 'non-coniferous' or broad leaved forests are reported by State Forest Departments according to types of ownership. The data are separately reported for forest area under State Forest Departments and other civil authorities, corporate bodies and private individuals. The emphasis on forestry development is on economic management or exploitation of the forests as sources of forest products. This calls for a further classification into 'merchantable forests' and

'others' as also 'unprofitable or inaccessible'. Data on area under forests according to legal status, i.e. 'reserved', 'protected' and 'unclassed' are also being collected for coniferous and non-coniferous forests separately. Some of the data are available according to species such as deodar, chir, kail and fir among coniferous trees, and sal, teak, sisso, dipterocarps and others in non-coniferous species.

61.10.6 With regard to classification, the importance of the various types of wood varies from State to State. We recommend that while the State Governments may adopt a more detailed classification for collection of the information in their own State they should collect the data on the uniform classification so that compilation at all-India level becomes possible. Statistics should also be collected according to functional classification viz protection forests, production forests and social forests referred to in Chapter 41 on Forest Policy.

Outturn of Major and Minor Forest Produce

61.10.7 Statistics of outturn of major forest produce are at present available for timber, fuel, logs, sleepers, etc. both in terms of quantity and value. These data are classified into 'coniferous' and 'non-coniferous' wood. Separate data are also to be reported for sawn timber, round wood, and fuelwood including charcoal wood and wood for distillation. Data on outturn are available for selected species such as deodar, chir, kail, sal, teak, sisso, simul and dipterocarps. In regard to minor forest produce, only statistics of value of production are available for bamboos and canes, drugs, fibres and flosses, fodder and grazing

and grass other than fodder. Data are also available for lac, gums and resins, dye-stuffs, tanning materials, bidi leaves, vegetables oils and seeds, charcoal, ivory, honey and bees-wax. The basic defect with the data of forest produce is that they relate only to the forests under the control of State Forest Departments who report data with regard to authorised removals only. Secondly, there is considerable quantity of timber and fuelwood grown outside the forest lands. Suitable procedures have to be devised to frame estimates of unrecorded production through sample surveys or otherwise at least once in five years. The possibility of collecting data on timber and fuelwood from agricultural lands through the periodical agricultural censuses should be examined.

61.10.8 Generally the coupes are auctioned in a standing position and so the figures of produce removed by the contractors lack accuracy. Hence, there is need for verifying the reported figures through sample checks. In the case of minor forest produce, quantitative estimates of outturn are not reported for several items. With greater emphasis on the exploitation of minor forest produce and better organisation of the agencies for collection of these produce, the need for getting improved data on both quantity and value becomes obvious. Sometimes, when the rights for exploitation of minor forest produce are auctioned, it may be difficult to get actual figures. Special efforts are needed to get reliable estimates of minor forest produce both in terms of quantity and value. As an example of how better statistics

will help in better administration it may be mentioned that in Madhya Pradesh after nationalisation of trade in tendu leaves, the revenue from tendu leaves shot up from Rs 86 lakhs in 1963-64 to Rs 812 lakhs in 1968-69. This was largely due to complete reporting of all tendu leaves collected. For evaluating the outturn, of both major and minor forest products the question arises as to the point at which the value is to be reckoned. For ensuring inter-State uniformity and correct estimation of the contribution to the national income from the forestry sector, the concept of value of outturn should be clearly defined and should relate to the value at the first point of sale by the forest departments.

Prices and Costs

61.10.9 Data on annual average wholesale prices of various species of timber, sleepers, fuelwood, pulpwood and plywood are reported for important assembling and marketing centres in different States. The scope of these statistics needs to be enlarged. Wholesale prices according to species and types of produce should be collected by size-classes at coup sites, Government depots and important assembling and marketing centres at intervals of a fortnight or a month. Wholesale prices of minor forest produce should also be collected regularly on a monthly basis to start with. For a study of the trends in prices of forest produce, compilation of index numbers of wholesale prices of timber, fuelwood and other forest produce should be initiated. Forestry items should also be included in the scope of the All-India Index Number of Wholesale Prices.

61.10.10 For indicating the lines on which improvement in the efficiency of forest management can be achieved a careful analysis of the costs of various operations from the stage of plantations to the actual marketing of timber is necessary. As these forest operations and management are done through departmental agencies, it should be possible to work out these costs on the basis of available data. What is important is to bring in the economic concepts and the usual principles of costing and making the data available either as part of administrative reports or as a regular series. Similarly compilation of data on cost of collection of minor forest produce together with the data on prices received for them would throw light on the measures necessary for improving the efficiency of collection of minor forest produce.

Employment in Forestry

61.10.11 The State Forest Departments report at present the number of persons employed annually in management, extraction and primary and secondary industries under various categories. Data on permanent and temporary labour force are also reported by some States. The available data, however, are incomplete and lack uniformity. In view of the highly labour intensive nature of the forestry sector, we recommend that regular data on labour employed in activities such as forest plantations, silvicultural operations, communications, tree-felling, transport, collection of forest produce and primary and secondary industries should be collected according to uniform concepts and definitions. Separate data for skilled and unskilled labour, source of labour- whether local or migrant and status of labour - whether wholly or partly dependent

on forest occupations, should also be collected.

Forest Inventory Surveys

61.10.12 Forest inventory surveys are basic for a proper and planned exploitation of this national asset. The data that needs to be collected relate to the stocking of various species, gross increment, cuts, natural losses by fire, insects and diseases and climatic factors, potential increment, production of minor forest produce, etc. These surveys need not form part of regular, annual forest statistics. The proposals regarding forest inventory survey are fully dealt with in Chapter 46 on Forest Planning, Research and Education.

Organisational Set up

61.10.13 Forest statistics, as already mentioned, are collected mainly as by-product of forest administration and management and would continue to be so. However, with increased requirements of statistical data for policy formulation, planning and implementation of forest development programmes, the existing agencies at different levels for collection of these data are inadequate and need to be strengthened. Range is the lowest administrative unit for forest management and at this level the Range Forest Officer is responsible for the collection and reporting of data in addition to his other duties. In order to enable the collection of the various types of data suggested by us, we are of the view that a full-time Forester (Statistics) should be provided in each range to attend to maintenance of registers, culling out data from the records and reporting them to higher levels in the

prescribed preformae. At the divisional level, the

Divisional Forest Officer should be assisted by a Range Forest Officer (Statistics) on a whole-time basis for this work. In addition to consolidation of information at the divisional level, he should also visit the different ranges and verify the accuracy of the various types of data collected in the ranges. He may be assisted by a Junior Statistical Assistant in compiling and consolidating the returns. At the circle level, the statistical agency will consist of a Class II Statistical Officer, assisted by requisite complement of Statistical Assistants and Clerks. Their functions will be not only to consolidate the data received from the different divisions, but also to analyse and interpret the data so as to help in the planning and formulation of suitable programmes.

61.10.14 At the State headquarters, the Chief Conservator of Forests should be assisted by a Director of Forest Statistics of the rank of Conservator of Forests. He should be assisted by requisite number of statisticians to deal with different aspects of forestry statistics. Corresponding strengthening is necessary at the level of the Ministry of Agriculture and Irrigation also. The existing statistical unit in the Central Forestry Commission should be developed into a fullfledged Statistical Division and put under the charge of a Statistician in an appropriate scale.

11 INPUT STATISTICS

61.11.1 In the field of fertilisers statistics, the data that are necessary are production, imports, quantities distributed by the different agencies namely, Government, cooperatives and private traders, consumption of fertilisers, stocks held at different levels and prices. The available data are incomplete and suffer from several inadequacies. Firstly, information on crop-wise consumption of fertilisers is not available. Secondly, the data on consumption do not tally with those worked out on the basis of production, imports and changes in stocks. In addition, more reliable information is also required with regard to consumption by different size classes of holdings, dosages of fertilisers, the time of their application, the constituents of mixed fertilisers, their responses etc. Wherever necessary, special surveys should be carried out to obtain this information. Data of inputs were also collected through the Agricultural Holdings Survey conducted by the NSS in its Twenty-sixth Round. It is also possible to collect these data through the Comprehensive Scheme for Cost of Cultivation of Crops.

61.11.2 Data on seed production is available in respect of seeds produced and distributed by the National Seeds Corporation. In addition, information on seeds distributed through Government agencies in the States is also available with the State Governments; but this information is not compiled at present at the Centre. Arrangements are also necessary for collecting the information from the private seed companies. Data on seed rates of different crops/ varieties should be collected to assess the requirements of seeds in different seasons and regions.

61.11.3 Similarly data on quantities of pesticides produced and distributed, and those applied to different crops have to be collected systematically. Some information on this subject is available in the progress reports received from the States in respect of crop development programmes; but the data need to be improved both in scope and coverage.

61.11.4 With regard to agricultural implements and machinery, the only comprehensive information available, is that collected through the quinquennial livestock census. The list of items covered by the census should be reviewed at the time of each census to include new items of machinery and agricultural implements introduced in the country on a sufficient scale. In addition, data on tractors and other agricultural machinery produced and imported are also available; but these data need to be systematised.

61.11.5 Three types of statistics of inputs can be distinguished. The first relates to the data on inputs, viz., seeds, fertilizers, pesticides and agricultural machinery, produced, distributed and utilised for different crops, at different levels, viz., all-India, State and district. These are aggregative type of data most of which can be compiled on the basis of the returns furnished by the concerned manufacturing concerns and distribution agencies. Information on cropwise utilisation of inputs may have to be based on sample surveys. The second type of information relates to the use of inputs classified according to holdings on which they are used and their characteristics, identification of areas where consumption of fertilisers is poor, factors which inhibit consumption of fertilisers and impact of

credit, weather, irrigation and prices on consumption of fertilisers. These have to be collected through periodic sample surveys discussed in Section 14. The third category of information deals with technical coefficients, dosages of fertilizers, seed rates and input application practices, responses to various inputs etc. These data also have to be based on specially conducted studies such as farm management investigations, cost of production studies, agricultural experiments, etc.

12 MARKET INTELLIGENCE

61.12.1 Fairly detailed, comprehensive and reliable data on wholesale prices of agricultural commodities are available in India. This is largely the result of the basic framework laid down by the Agricultural Prices Enquiry Committee, 1954 (Chairman: P.N. Thapar). Not only the reporting agencies were specified in the different markets but the concepts and nature of the quotations to be reported were also laid down. The DES through its market intelligence staff also maintains a close watch on the reporting of the prices. In India, as mentioned in Chapter 56 on Marketing, Transport and Storage, there are about 4,145 regular wholesale markets besides over 22,000 periodical markets or *shandis* held bi-weekly, weekly or fortnightly in rural areas. Of the total number of the wholesale markets 2,936 have already been regulated and the scope of regulation is being gradually extended to others. In important markets whole-time price reporters have been appointed under the Scheme for Improvement of Market Intelligence. There are about 550 such reporters working in different markets of the country which report regular price and other market data to the Centre as well as the States.

61.12.2 At the State level, the work regarding collection and reporting of prices and other market intelligence is looked after by Marketing Departments/Directorates in most of the States. Arrangements for supervision and training of price reporting agencies at centres other than those for which data are reported to the Government of India, need to be strengthened.

61.12.3 At the Centre the DES obtains telegraphically daily wholesale prices of foodgrains in respect of 140 markets covering primary, secondary and terminal markets. Weekly wholesale prices are collected from about 530 markets in respect of 130 agricultural commodities. Daily retail prices of foodgrains are collected from over 90 centres and weekly retail prices of agricultural commodities from 215 centres. Weekly data on market arrivals and stocks of important agricultural commodities are also reported from 1,300 markets spread all over the country. The DES also, collects lot of other market intelligence but the same is not published regularly.

61.12.4 Further improvements in market intelligence should be in the following directions:

- i) Emphasis so far has been on current information. To improve the usefulness of price and other market intelligence efforts should be made to issue periodical reports on outlook for future to provide material for advance action to forestall local shortages, scarcities or glut.
- ii) Market intelligence for pulses, edible oils, important fruits and vegetables, minor oilseeds and condiments and spices should be organised on the same lines as for cereals and fibres.
- iii) The study on costs and margins should be extended to more centres and crops.
- iv) All the regulated markets in the country should be made reporting centres for price collection. The States should have a bigger number of centres than than at present for their own use.
- v) Whole-time technical reporting agencies should be set up in all the important whole-sale markets according to a phased programme.
- vi) The scope of market news service should be extended gradually so as to increase the number of markets and commodities in respect of which market news is disseminated by the All India Radio and through other media.

61.12.5 The DES collects periodical information regarding prices prevailing in important world markets for a few important agricultural commodities entering into the import-export trade. There is, however, considerable timelag in the availability of the data. The coverage of the commodities and centres is also not adequate and needs to be enlarged. We suggest that the whole question of the scope and coverage of the foreign market intelligence should be reviewed in consultation with the Ministry of Commerce and adequate arrangements should be made for their systematic collection. The help of Indian Embassies and High Commissions abroad and foreign Embassies and High Commissions situated in India may be taken wherever necessary in collecting upto date information

61.12.6 With regard to stocks, the only complete and reliable data that are at present available are those relating to stocks of foodgrains held by the Government in their own godowns, or godowns of the Food Corporation of India. In the case of cash crops like cotton and jute data on stocks held by trade are available. Some data are also available with regard to stocks pledged with the banks. The market arrival returns also give some data on stocks, but these are not very reliable. It is necessary to improve the availability of data on the stocks with farmers, consumers and various agencies such as wholesalers, retailers, etc. Even with regard to storage accommodation, although information regarding the total storage constructed by different agencies is available, its occupancy by commodity and period is not available. This information should also

be collected. The CIAS should look into this question and evolve appropriate methodology for collecting complete data on stocks, periodically, which could be implemented thereafter.

13 AGRICULTURAL CENSUS

61.13.1 The approach to agricultural planning in India so far consisted mainly in setting out targets of production for different crops and other agricultural commodities at the national and State levels after taking into account the potential resources available under the plans. In the absence of the detailed data on existing and potential resources for various agro-climatic regions at the block and farm levels, the task of planning from below discussed in Chapter 60 on Planning, becomes difficult. In the ultimate analysis it is the farmer who takes the decision what to produce, when to produce and how much to produce. The programmes and incentives which are given to the farmer should also take cognizance of the basic characteristics of the farmer's holdings such as the size distribution, the pattern of land use, availability or otherwise of water and the resources in human, animal and mechanical power on the farm. It is in this context that agricultural census through complete enumeration of holdings to give the number, size and other characteristics of holdings, becomes important.

61.13.2 Till recently, one of the lacunae in the agricultural statistics system of the country was absence of data on cultivators' holdings in sufficient detail. Though data on operational holdings were collected by the NSSO as part of the socio-economic surveys, in the eighth, sixteenth, seventeenth and twentysixth rounds, these were designed to provide data only at the all-India and State levels. Realising the importance of data on the structure and characteristics of agricultural holdings, the Government of India decided to conduct an

agricultural census with 1970-71 as the reference year, as part of the 1970 World Agricultural Census sponsored by the FAO. The method adopted for the census was complete enumeration by retabulation of the data already available in the land records. In States where land records are not maintained, e.g. West Bengal, Orissa, Kerala, Meghalaya, Nagaland and Manipur and a few Union Territories, the data were collected through a sample survey. The Ministry of Agriculture and Irrigation propose to repeat the Agricultural Census, but on a sample basis, with agricultural year 1976-77 as the reference year. We commend the proposal.

61.13.3 The main Agricultural Census through complete enumeration was confined to number and size of holdings, land use and crops grown, irrigation and tenancy. Data on input use and other related characteristics were collected in the States of West Bengal, Orissa, Kerala etc. in the 1971 Census. It is proposed to extend the scope of the input survey to all the States in the 1976-77 Census.

61.13.4 One of the basic difficulties that has been experienced in the Agricultural Census, 1971 has been that it could provide information on open tenancies only. Since concealed tenancies are not mentioned in the land records and as the method of retabulation from land records was adopted for the Agricultural Census, there was no means of getting correct information with regard to the defacto position of the actual cultivation of the land. In some States, though special steps were taken to collect information on who actually cultivated the land, in view of the various land reforms measures on the anvil, correct information regarding the concealed tenancies might not have been furnished. However, when land reforms legislation

is implemented and when tenancies are regulated, and in particular when the rights of all the crop sharers are recorded, the situation is likely to improve, in future Agricultural Censuses.

61.13.5 Another gap in the information provided by the 1971 Census is that because of the method of collection of data adopted, information on fragmentation was also not available. In view of the need for this information particularly with regard to the priorities to be attached in implementing consolidation of holdings programme, we recommend that the data on fragmentation might be collected in the sample surveys proposed to be taken up in conjunction with the agricultural census.

61.13.6 The results of the 1970-71 Census became available only in December, 1975. While the reasons for the delay are understandable, the 1971 Census being the first of its kind in India, we could have made better use of the data if the information was available earlier. Special efforts are, therefore, necessary to see that the data for 1976-77 Census become available by the end of 1978 at the latest

61.13.7 As already mentioned the NSSO undertook a survey of land holdings in 1971-72 in the twenty-sixth round to provide data on the structure of agriculture and use of chemical fertilisers and manures by specific types on irrigated and un-irrigated crops grown during the reference period viz., 1970-71. The Statewise results of this survey have recently become available.

14 INTEGRATED SYSTEM OF AGRICULTURAL SURVEYS

61.14.1 A large variety of data on different aspects of agriculture are being collected at present. The needs for collection of data are expanding faster than the rate at which the improvements in statistics are taking place. The modernisation of Indian agriculture as envisaged by us and the agricultural planning techniques recommended would need the collection and compilation of a large quantity and variety of data with different periodicities. Obviously, all the data cannot be collected every year nor are these needed. For example, data on the structure of holdings need not be obtained every year as this does not show significant annual variations. Quinquennial censuses based on complete-enumeration or sample surveys will serve to throw light on the changes in the structure and characteristics of holdings. For meeting the data needs in the sphere of agriculture referred to in the different Sections, the best approach is to devise an integrated system of agricultural surveys covering both current agricultural surveys and periodical agricultural and livestock censuses. The integration essentially consists in combining, wherever feasible, surveys with the common sampling units and staggering the programme of collection of data over a period of five years, taking up a major group of items each year. Sample surveys can be superimposed on complete-enumeration enquiries both for checking up the reliability of the data and for providing additional information. The agencies for the collection of data can also be employed rationally by combining different surveys. We envisage primarily undertaking four

types of surveys viz:

- i) those with field as the unit,
- ii) those with holding as the unit,
- iii) those with livestock holding as the unit, and
- iv) cost of production enquiries

All these together can form National Agricultural Surveys.

61.14.2 In the case of the surveys with field and holding

as units, the items to be canvassed would relate to:

Field as a unit

- i) improved seeds,
- ii) fertilisers and manures,
- iii) irrigation, drainage and soils,
- iv) plant protection, and
- v) cultivation practices and extension.

These can be covered by rotation over a period of five years.

Holding as a unit

- i) characteristics of holdings as in the agricultural census;
- ii) data required for production and utilisation accounts;
- iii) debt, investment and savings;
- iv) employment, unemployment, underemployment, labour force and labour inputs, and
- v) food consumption and nutrition.

These items can be covered in different years. In the field of animal husbandry, the five-year programme should successively cover:

- i) quinquennial livestock census with a sample survey for the additional particulars about breeds and age-composition,
- ii) milk and milk products,
- iii) poultry and poultry products,
- iv) wool,

v) meat and meat products and hides and skins.

Changes in livestock numbers and also in the output of products other than the main product under survey in a particular year can be studied every year. The cost of production surveys should also be conducted in a phased manner taking up for study different crops and animal husbandry products during the different years. Some of the integrated agricultural surveys can be dovetailed into the agricultural surveys being conducted under the auspices of the NSSO.

61.14.3 As techniques of agricultural planning are improved, a continuous appraisal of the resources of agricultural holdings will be necessary. It is possible to secure this information by obtaining data on selected characteristics in respect of a rotating sample of holdings continuously, year after year. This rotating sample may form a sub-sample of the main sample selected for the annual survey of holdings envisaged under the National Agricultural Surveys. This method is known as the Perpetual Inventory Method. We suggest that this development may be kept in view in the future agricultural statistics system of the country.

61.14.4 The surveys with the field as a unit can be combined with the crop cutting surveys at present carried out in different States under the technical supervision of the NSSO. Even at present there is provision for giving the information on the various inputs in the preliminary return to be furnished by the primary agency immediately after the field is selected for crop cutting. This information is at present not being tabulated. By reviewing the scope of the return and modifying

it to provide details of information required each year, and tabulating the data collected, very useful information on the various inputs can be collected at very little extra cost.

61.14.5 After re-organisation, the NSSO even at present has a phased programme for collection of information on different items as part of socio-economic rounds as under

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|------|---|---------------------|
| i) | population, births, deaths, disability, morbidity, fertility, maternity, child care and family planning | once in ten years. |
| ii) | debt and investment and capital formation | -do- |
| iii) | land-holdings and livestock enterprises | -do- |
| iv) | employment, unemployment rural labour enquiry and consumer expenditure | twice in ten years. |
| v) | self-employment in non-agricultural sector | -do- |

The five groups of subjects cited above would cover, in all, seven rounds of a year each out of the ten-year programme. The remaining three years out of a decade have been kept open for undertaking surveys on subjects unexplored so far as also to accommodate special requests from the Central and State Governments. Thus a system of phased collection of information on various items has already been adopted by the NSSO. The essential difference is that the ultimate sampling unit in the socio-economic surveys of the NSSO is the household. For agricultural purposes, what is needed is the operational unit of cultivator's holding. It is, however, possible to establish the relationship between the operational holdings and household holdings and collect the relevant information through the NSSO.

61.14.6 Reference has been made to the surveys with the livestock holding as a unit in Section 8.. We recommend

that the various integrated surveys which we have referred to might continue to be carried out by the agencies responsible for the different subjects as at present. What is, however, needed is that there should be adequate arrangements for technical coordination and guidance. We suggest that the Governing Council of the NSSO should examine this question further.

61.14.7 Thus, the tendency to organise a fresh survey whenever any information on a new item is required should be discouraged. Hereafter, there should be the annual crop surveys/^{related} livestock surveys/fisheries surveys which should provide all the information required at yearly intervals. Other information required at periodical intervals should be fitted into the quinquennial agricultural censuses or sample surveys/livestock census/fishery census or into the cost of production enquiries. These could be ultimately developed into a system of **National Agricultural Surveys**. Information on any other items not covered by these surveys should be collected through the National Sample Surveys whenever possible.

15 RESEARCH STATISTICS

61.15.1 Till recently, research work in agriculture was handicapped by the absence of a unified record of experimental data in the country to serve as a reference and guide for future experimentation. IARS has filled up this gap by preparing the National Index of Field Experiments which is a collection of all relevant details of several thousands of scientifically planned and conducted agricultural experiments in the State and Central institutes. The index contains a wealth of information for the research and development workers in the country and helps them in planning their future programme. The data collected under the project are also being made use of to undertake research studies of agricultural and statistical interest. For example, studies on the effect of irrigation on crop yields and its interaction with other factors such as fertilisers, varieties, cultural practices, are in progress.

61.15.2 As already referred to earlier, to meet the needs of the data for planning etc., the IARS has developed appropriate statistical methodology for estimation of yield of various crops including condiments and spices and fruit crops. The feasibility of employing sample survey techniques in the fields of animal husbandry and marine fisheries has also been successfully demonstrated for adoption on regular basis by the States. Efforts should be made to evolve suitable techniques for estimation of area and production of vegetables and fodder crops also.

61.15.3 With the introduction of high yielding varieties during recent years, an acute need was felt for an objective assessment and evaluation of the programme. IARS initiated sample surveys for assessment of HYV programme in 1968-69 with the objective of collecting reliable data on the extent of cultivation of high yielding varieties, the yield rates of these varieties and comparable estimates of local varieties and extent of adoption of improved agricultural practices recommended for high yielding varieties in these districts. The coverage of the surveys was extended to 88 districts spread over 15 States by 1971-72. The results of these surveys have thrown light not only on the actual achievement under the High Yielding Varieties Programme but also provided a sound and realistic basis for agricultural planning, policy formulation and target setting at the State and national levels. The scope of these surveys, however, needs to be extended to provide information on the local factors and problems contributing to low or high yields in different regions to serve as the basis for accelerating the pace of agricultural development.

61.15.4 The results of agricultural experiments conducted at various research and experimental stations may not be strictly applicable to farmers' fields. Experimentation on cultivators' fields, therefore, is necessary before making recommendations for adoption. Such experiments have to be representative of the range of cultivators conditions, fairly simple and scientifically rigorous so that valid scientific data become available for making recommendations. IARS has developed suitable designs for such experiments and at present these experiments are being adopted on a large scale all over the country.

61.15.5 Cost of production studies in agriculture present special difficulties as production is largely in the hands of small and illiterate cultivators who do not keep any accounts. IARS has developed suitable statistical techniques for carrying out large scale studies for estimation of cost of production of principal crops and livestock products. Efforts should be made to evolve suitable techniques for estimation of cost of production of important fruits and vegetables also.

61.15.6 In the field of animal sciences, IARS has collected and analysed large bodies of data pertaining to breeding of cattle, buffaloes, sheep and goats. These studies have provided useful information on the inherited economic characteristics which form the basis for preparing efficient breeding plans for the future. The Institute has also been helping research workers with suitable experimental sampling plans and appropriate techniques of analysis of data.

61.15.7 During recent years the demand for fertilisers has been gradually increasing. However, as a result of the recent fuel crisis, serious shortages in supply of fertilisers are being experienced not only in India but in the developed countries in the western world. In this context an important field which needs to be attended to relates to the optimum use of fertilisers in relation to crop production. The work regarding determination of optimum dosages of fertilisers for different crops in different regions already being done by IARS needs to be expanded.

61.15.8 Consequent upon the increasing tempo of agricultural and animal husbandry research, new type of statistical problems are being thrown up. To tackle the various research problems,

to coordinate and supervise the programmes of statistical surveys and schemes sponsored by IARS in the various regions of the country and to expand the programmes for training in agricultural statistics, it is necessary that the Institute should be suitably strengthened.

16 DERIVED STATISTICS AND INDICATORS OF AGRICULTURAL ECONOMY

61.16.1 Several derived statistics and indicators of the agricultural economy are being currently worked out and published by the different Central and State Government Organisations with a view to meeting various requirements such as for studying ~~the~~ trends over time in respect of area, yield, production, productivity and prices etc., and that for studying the comparative performance of different regions in regard to their agricultural development.

61.16.2 The main derived statistics comprise the different agricultural index number series and growth rates, though a number of other derived statistics are also being made use of for various purposes in the field of agriculture. These index number series have been constructed after making due allowance for changes in the coverage and methods of estimation due to which the absolute figures of area, yield and production etc. are known to be unsuitable for study of trends over time. We have reviewed the current status of such derived statistics and indicators of the agricultural economy with a view to effecting improvements in their quality. This review has revealed that although a number of improvements have been introduced in regard to agricultural index numbers through implementation in part of the recommendations of the Technical Sub-Committee on Index Numbers set up by the Ministry of Agriculture and Irrigation under the chairmanship of Dr. V.G. Panse in 1965, there is still scope for further improvements. Likewise, although the available information in regard to some of the other derived statistics serves the present day

needs, improvements need to be effected in the case of others.

61.16.3 Revised series of the all-India index numbers of area under crops, net area sown, cropping intensity, cropping pattern, crop yields, productivity per hectare and agricultural production with the triennium ending 1961-62 as base are being compiled and issued by DES in the light of the recommendations of the Technical Committee. At the State level, index number series are being issued by the State Governments. Revised series on the lines of the all-India series have been compiled so far only by 5 States, viz., Haryana, Jammu & Kashmir, Punjab, Rajasthan and Tamil Nadu. To enable comparison of the performance of different States in the agricultural front, it is necessary to issue similar series for the remaining States. All-India and State series of index numbers should be published every year with the minimum possible time-lag.

61.16.4 The new series of index numbers of harvest (producers') prices, as recommended by the Technical Committee should be initiated as early as possible. Compilation of the revised series of index numbers of parity between prices received and prices paid by the farmer recommended by the Technical Committee, has been initiated only by 3 States (viz. Bihar, Haryana and Punjab). Bihar has, however, adopted a different base period than that recommended by the Technical Committee. The question in regard to change in the base period for Bihar and initiation of Statewise series in respect of States which have not yet started their compilation should be taken up and pursued with the concerned State Governments. All-India series should also be built up.

61.16.5 In order to provide ready basis for comparison of the productivity of different regions, index numbers of gross agricultural output per hectare and per agricultural worker for different crop regions of the country were issued only once viz. for the 3 year period ending 1958-59. These index numbers should be issued periodically say once every 5 years, in future.

61.16.6 In regard to **growth** rates in agriculture, Statewise and district-wise studies carried out by the DES covered the period upto 1964-65. These studies have, however, become out of date. Further, among these, the district-wise studies ~~covered~~ only a few States viz. Orissa, Punjab, Uttar Pradesh and Tamil Nadu. As such, periodical studies need to be undertaken in this regard covering all the districts/States at more frequent intervals.

61.16.7 Information regarding crop-wise input-output relationships in relation to size of holdings is needed by research workers, policy makers and administrators. The available data based on farm management surveys are out of date. A Comprehensive Scheme on the Cost of Production of Principal Crops has been sponsored by the DES. Technical coefficients should be worked out on the basis of these data and the results analysed to provide upto date data on input-output relationships.

61.16.8 For preparation of commodity balance sheets, information is needed not only on the estimates of output as it leaves the farm but also in terms of the processed commodity and the byproducts. Thus in the case of paddy, data are needed on the milling ratios to give separate estimates of output of

rice and byproducts like husk and bran. In the case of sugarcane which is consumed in different forms, e.g., in the form of cane for chewing or juice, raw sugar, refined sugar and khandsari, separate estimates output of these processed forms and cane utilised for each purpose are needed. The available information in this regard for oil-seeds, vegetable oils, sugarcane, cotton, jute, milk and other livestock products is mostly based on old surveys and as such has become out-dated. Fresh surveys, therefore, need to be conducted in a phased manner so as to make these data up-to-date.

61.16.9 While the estimates of national income including the contribution of agriculture to national income are published by the Central Statistical Organisation (CSO), there is need for compilation of National Accounts for Agriculture both by household and commodity disposition. Analysis of this type of data for the agricultural sector should be done by the DES in close collaboration with the CSO.

61.16.10 One of the basic difficulties in the introduction of the crop insurance schemes has been the absence of reliable data on variability in yields of different crops for smaller areas. Now that data on crop yields are available for a long period of time, these should be analysed periodically to provide a basis for fixation of insurance premia for different crops/regions.

61.16.11 We have also drawn attention to the statistics required for planning in Chapter 60 on Planning and those required for making demand projections in Chapter 10 on Demand Projections.

17 TABULATION, PUBLICATION AND DISSEMINATION

Computerisation

61.17.1 Most of the tabulation of regular official agricultural statistics at different levels is done manually or through simple calculating machines. At the Centre only data on prices, market arrivals and cost of production and growth rates, are analysed on the electronic computers. In view of the numerous advantages of computers and the proposal for setting up of computer centres and data banks at the State and regional levels during the Fifth Plan period, the scope for use of computers in the collection, compilation and analysis of official agricultural statistics like land utilisation, irrigation, area and production of crops, price intelligence, animal husbandry statistics, fisheries statistics, etc., needs to be carefully examined. A beginning in this regard should be made by transferring the basic data for past years to magnetic tapes for depth studies, easy and timely retrieval and accuracy of tabulation. If found useful, this could be followed up to cover current data.

61.17.2 We have recommended in Section 18 the provision of simple calculating machines at the tehsil and district levels to improve the accuracy of tabulation and to expedite the compilation of data at different levels.

Publication and Dissemination

61.17.3 A number of organisations, both official and non-official, are at present engaged in the collection, compilation and analysis of data relating to various aspects of agriculture at different levels. These organisations are also periodically issuing a number of publications giving information on different

items to meet the needs of policy makers, administrators and research workers. We have reviewed the current status of such publications with a view to examining their adequacy for present-day needs. This review revealed that although a number of improvements in the contents, coverage, timeliness etc. of different publications have been effected during recent years, there is still scope and need for further improvements to serve the needs of various users. For example, information on a number of important items is not available. These gaps and the measures necessary to fill them up have been discussed in various sections. Another draw-back of these publications is that these generally become available with a considerable time-lag due to which their utility gets considerably impaired. This time-lag is partly due to delay in receipt of information from the basic sources and partly due to delay in bringing out such publications. The delay in bringing out such publications can be remedied by providing the departments concerned with printing facilities of their own or reserving a government printing press for such statistical work. In regard to the delay in receipt of information from the basic sources, it is necessary to impress upon the reporting authorities the need for timely submission of prescribed returns and periodically review the progress of reporting of such statistics at joint meetings of Central and State authorities to identify the bottlenecks and to suggest measures for removing them. In the case of missing information on some items or certain States or districts, efforts should be made to release the data in the form it is available pointing out its limitations and making provision

for subsequent revisions in such estimates as and when the relevant missing information becomes available.

61.17.4 To help research workers, to locate the desired information with facility, a bibliography of all printed or cyclostyled reports on different aspects of agriculture including those intended for limited official use should be brought out regularly by a Central agency.

61.17.5 Another draw-back that needs mention is that most of published data relate to past periods and information regarding outlook for the future is generally not available. Efforts should, therefore, be made to issue situation and outlook reports containing uptodate and authentic information on production prospects, prices, exports etc. in respect of important agricultural commodities.

18 ORGANISATIONAL SET-UP FOR STATISTICS

61.18.1 Collection of agricultural statistics is beset with several difficulties in view of the fact that these relate to small units scattered all over the country and have to be collected within a limited period of time. Farmers being mostly illiterate, enquiry method cannot be relied upon and direct observation and physical measurement have to be resorted to for collecting reliable information. With the gradual increase in the requirements of data for policy, administration and planning, collection of agricultural statistics has become all the more difficult. For proper development of agricultural statistics on the lines recommended in the earlier sections, sound and comprehensive organisation is needed at different levels. Questions regarding the agency for collection of area statistics, strengthening of primary agencies for crop-cutting surveys, institution of central supervision over the work of area enumeration, strengthening of State and Central supervision over the conduct of cropcutting surveys, setting up of statistical units in State Irrigation Departments, organisational set up for animal husbandry, forestry and fisheries statistics and strengthening of the wholetime technical reporting agencies for market intelligence have already been discussed in the relevant sections. The organisational set up for agricultural statistics especially basic statistics of land utilisation, area and production, etc. at tchsil, district, State and Central levels is discussed below.

61.18.2 At the primary level, the Patwari has to continue to collect the basic agricultural statistics relating to land utilisation, area under crops and irrigation based on complete

enumeration of all fields. We have suggested the improvements necessary in this system in an earlier Section. But for a radical improvement in agricultural statistics, it is necessary to have a professionally competent, fully trained and unified statistical organisation from the level just above the Patwari and/or Kanungo right up to the State and Central levels. In many States, statistical staff at the district level dealing with agricultural statistics exclusively exist. In a few States, Taluk Statistical Assistants dealing mostly with agricultural statistics have been recently appointed. What is needed is that the statistical staff at different levels should be fully qualified and given adequate training and their services should be utilised exclusively for agricultural statistics.

Tehsil Level Staff

61.18.3 Tehsil is an important link in the flow of agricultural statistics. It is, therefore, necessary to ensure that the statistics flowing through that level are properly checked and scrutinised. At present, in most of the States there is no provision for technical staff to look after this type of work at the tehsil level. It is necessary to provide one Statistical Supervisor in each tehsil to supervise field work of different censuses and surveys to the extent of about 10 per cent, to scrutinise the basic returns like crop abstracts etc., received from Patwaris, Revenue Inspectors, etc. to check village totals in the basic village forms or Khasra registers for at least one village per Patwari and to collect other development statistics on selected items. This Supervisor will work under the Tehsildar. To improve the

accuracy of tabulation, one hand operated calculating machine should be provided for each tehsil. The firms manufacturing the calculating machines should be induced to set up maintenance centres at convenient locations.

District Level Staff

61.18.4 A statistical unit consisting of a District Agricultural Statistics Officer assisted by one Statistical Supervisor/Assistant and one Junior Clerk/Computer should be provided at district level to supervise and coordinate agricultural statistics work at the district level. He will work under the Chief Agricultural Development Officer (CADO) proposed by us at the district level in Chapter 62 on Administration. He will help the district authorities in the compilation, scrutiny and analysis of agricultural statistics and submission of returns to the State and Central Organisations. One hand operated calculating machine should be provided to ensure accuracy in the computational work done at the district level.

Set-up at State Headquarters

61.18.5 The set up for agricultural statistics at the State level differs from State to State. In most of the States, this work is handled by the Bureaus of Economics and Statistics, which deal with statistics in different sectors of the economy. In some States like Uttar Pradesh, Maharashtra, Madhya Pradesh, Punjab, Haryana and Gujarat, the work of agricultural statistics is handled by the Agricultural Statistician under the Director of Agriculture/Land Records. In view of the diversity of the administrative set up in different States no uniform pattern for agricultural statistics organisation at the State level can be laid down and it has to be left to the

administrative convenience of the State Governments. However, it has to be ensured that an adequate organisation, irrespective of where it is located, should be built up at the State level to organise collection, compilation, analysis and processing of agricultural statistics according to a minimum programme and making available the final results to all concerned including the Central Government according to an agreed time schedule. The existing organisations at the State level should be suitably strengthened to enable them to effect necessary improvements in the data being collected at present and to organise collection of additional information on the lines recommended in different sections. The Head of the State agricultural statistics organisation should be a qualified statistician with adequate experience in any one or more fields of agricultural statistics viz., crop statistics, animal husbandry statistics, fisheries statistics and agricultural research statistics. He should be in an appropriate scale not less than Rs 1,500-1,800. If this organisation forms part of the Bureau of Economic and Statistics, the officer in over-all charge of agricultural statistics should have the status of Additional Director of Statistics (Agriculture). The Agricultural Statistician though belonging to the cadre of the Bureau, should be administratively under the Agricultural Production Commissioner (APC) and be physically located in the same building so that the APC could have the benefit of the Statistician's advice and assistance in the day-to-day affairs. If the organisation is located in the State Agriculture/Land Records Department,

the officer should have the rank of Additional/Joint Director of Agriculture/Land Records (Statistics). It should be the duty of this officer to advise the APC, Secretary and Director of Agriculture and other concerned officers at the State level on all statistical matters relating to agriculture. He should be assisted by adequate number of Statisticians and Assistant Statisticians in appropriate scales and lower technical and ministerial staff. This organisation should also have a few qualified economists to take charge of economic investigations in the field of agriculture. The statistical organisations in the fields of agriculture, animal husbandry and fisheries in States where these are in the Bureau should belong to the general State Statistical Cadre, so that the career prospects of the statisticians working in separate units are not adversely affected. In States where these organisations are not in the Bureaus the statisticians in the fields of agricultural, animal husbandry and fisheries statistics should form a separate common cadre.

61.18.6 At the Central level, the DES is mainly responsible for laying down uniform concepts and definitions, specifying minimum data needs, collection, compilation, analysis and publication of agricultural statistics. For this purpose the DES maintains close liaison with the State Governments and other Central organisations. For effective coordination and implementation of programmes for improvement of agricultural statistics, the Agricultural Intelligence Division of the DES needs to be strengthened. Separate units for handling work of outlook studies, timely reporting and improvements of crop statistics schemes, statistics of minor crops like fruits

and vegetables and byproducts of principal crops and index numbers relating to agricultural economy and growth rates should be set up. In order to ensure that the schemes for improvement of crop statistics are implemented effectively by the States and for providing them technical guidance as and when necessary the DES should have Regional staff at the appropriate technical levels in the different regions.

61.18.7 NSSO is at present in overall charge of technical guidance and supervision of crop-cutting surveys and for institution of central supervision over the work of area enumeration and sample check of crop cutting experiments under the new scheme for improvement of crop statistics' in 5,000 villages. NSSO should be suitably strengthened to attend to the above items and also to enable it to take up pilot and large scale sample surveys in other spheres such as livestock, fisheries, etc. If the sample size is required to be expanded further strengthening would be needed.

61.18.8 To tackle the various research problems emerging from the increasing tempo of agricultural and animal husbandry research, the IARS should also be suitably strengthened.

Training in Agricultural Statistics.

61.18.9 We have drawn attention to the need for refresher training of the Patwaris and Kanungos in paragraph 61.2.9. There is need for periodic training of the statistical staff employed in the State and Central organisations dealing with agricultural statistics. Suitable training courses should be developed and training organised in the IARS, ISI, FRI, DES and CSO. These organisations should be

adequately strengthened to meet the increased demand for trained personnel in agricultural, animal husbandry, fisheries and forestry statistics.

61.18.10 It has been observed that, in the past, schemes for collection of basic data involving field visits by the primary and supervisory staff have suffered because of cuts in the budgetary provision for travelling allowances etc. It is recommended that in the case of statistical schemes funds should be provided separately and no cuts in the travelling allowance etc. should be applied after the scheme

- iii) Indian Council of Social Science Research (ICSSR);
- iv) agricultural and other universities; and
- v) other institutions.

Studies sponsored by the Ministry of Agriculture and Irrigation

61.19.3 Two sets of institutions, one mainly for studying changes in the rural economy and the other solely for farm management investigations were sponsored by the Ministry of Agriculture and Irrigation in the beginning from 1954. The former are known as agro-economic research centres and the latter as centres for farm management studies. While AER centres have been set up on a regular and long-term basis, FMS centres are purely temporary and are generally wound up as and when the three-year investigations and subsequent reporting are completed.

62.19.4 In all, eleven AER centres have been set up so far in different agro-climatic regions and the whole country is divided suitably among them to carry out agro-economic investigations. These centres are located either at universities or research institutions devoted to economics, and are financed wholly by the Ministry of Agriculture and Irrigation. The main functions of these centres are:

- i) to undertake village surveys and resurveys at suitable intervals of time with a view to studying changes that take place in the village economy and identifying the forces engendering such changes;
- ii) to conduct investigations into specific problems and indicate possible lines of action; and
- iii) to carry out problem-oriented studies with uniform designs and mutually agreed methodology and cross-section studies of different aspects of the village economy.

61.19.5 The AER centres have completed about 355 village surveys and 86 repeat surveys. The reports on these surveys and repeat surveys contain a wealth of information and statistical data, not only on various aspects of the rural economy but also about the changes that are taking place in rural India and the factors influencing the changes. Besides, a number of very comprehensive problem-oriented studies have been carried out by these centres on subjects like food control, procurement and distribution; working of fair price shops, pace and pattern of market arrivals of foodgrains; cooperative farming; economics of irrigation and water rates; evaluation of high-yielding varieties programme; loans from land mortgage banks; special employment programmes; and income, savings and investments in agriculturally progressive areas. The results of these studies have been useful in policy formulation exercises.

61.19.6 Simultaneously with the setting up of AER centres, the Ministry of Agriculture and Irrigation also sponsored a series of investigations into the economics of farm business in typical soil-climate-crop complexes in the country. Studies have so far been completed in 22 regions, and repeat studies in five of them. These have yielded very valuable data in respect of structure and organisation of farms, cost of cultivation of individual crops, utilisation of human and bullock labour, input-output relations in crop production, profitability of farming in general, and other aspects of the farm-enterprise. More recently, an all-India cost of production enquiry has been sponsored by the Ministry which is being carried out since 1970-71. Under this scheme

detailed data are being collected on various inputs that go into production of crops and the resulting yields with a view to obtaining estimates of cost of cultivation and production of important crops. Such data are a pre-requisite to any review of price policies relating to farm products. Agricultural universities are involved in this programme in so far as field work for the enquiry is mainly their responsibility.

61.19.7 Besides, Department of Rural Development of the Ministry of Agriculture and Irrigation have sponsored some special studies for obtaining statistical data on conditions of employment, unemployment and under-employment in rural areas and ancillary information required in connection with the formulation of the crash programme on employment. The studies were carried out with the help of about 13 institutions and proved very useful.

61.19.8 An Economic Policy Cell has also been set up in the DES to examine and study important issues relevant to agricultural planning and policy on a regular and continuous basis and to advise the Ministry of Agriculture and Irrigation on various problems in the sphere of agricultural economics. The Cell is not expected to undertake any field surveys on its own, but work on the basis of secondary data available from other sources. The Research Division in the DES coordinates the work of AER^s centres and FMS centres while the cost of production enquiries are coordinated in a separate unit.

Projects Sponsored by the ICAR

61.19.9 The ICAR, through one of its specially constituted committees (now called the Scientific Panel on Agricultural

Economics and Marketing) has been sanctioning from time to time schemes having a bearing on agro-economic aspects of the rural economy. Financial grants are provided by the Council for undertaking such studies which are generally carried out on ad-hoc basis, for a limited period of time. A large number of studies covering different facets of the rural economy have been supported by the ICAR since its inception.

61.19.10 The IARS a constituent of the ICAR, is also involved in agro-economic research to a limited extent through their methodological investigations, pilot project experimentation as also field investigations and supervision as in the case of evaluation of the Intensive Agricultural District Programme.

Studies sponsored by Planning Commission and ICSSR

61.19.11 The Planning Commission had set up a Research Programme Committee (RPC) in 1953 which actively encouraged research in agro-economic problems in universities and research institutions of repute. It sponsored nearly 300 studies on various subjects relating to agriculture and related sectors of the economy. The Indian Council of Social Sciences Research (ICSSR), set up in 1969 in the Ministry of Education and Social Welfare, took over most of the functions of the RPC and has been promoting research in social sciences since then. The Council has set up, jointly with the ICAR, a Joint Scientific Panel for Social Sciences and Agricultural Economics in March, 1974. The main functions assigned to the Panel are to study the social infrastructure needed

for rapid spread of new agricultural technology, to review periodically research work on social aspects of agricultural technology and to suggest measures for co-ordination of activities. The Panel is also expected to suggest co-ordinated programmes of research and model schemes in the disciplines assigned to it and to lay down priorities for research. The Planning Commission continues to sponsor socio-economic research on problems having a direct bearing on plan formulation and implementation. For instance prior to launching the Small Farmers' Development Agency and the Programme for Marginal Farmers and Agricultural Labourers, the Commission sponsored ad-hoc enquiries into the problems of these vulnerable sections through universities, research institutes and individual research workers which yielded bench mark indications and guidelines for policy.

Agricultural and other Universities

61.19.12 Agricultural economics sections of the agricultural universities generally undertake research work and carry out agro-economic surveys and studies in areas within their jurisdiction. Most of these universities are involved in the cost of production enquiry sponsored by the Ministry of Agriculture and Irrigation. Some general universities also take up studies in the departments of economics and applied economics.

Other Institutions

61.19.13 Besides the agencies mentioned above, there are good number of institutions devoted to agro-economic research. These include the following:

- i) Gokhale Institute of Politics & Economics, Poona;
- ii) Institute of Economic Growth, Delhi;
- iii) Institute of Social and Economic Change, Bangalore;
- iv) Centre for Development Studies, Trivandrum;
- v) Indian Society of Agricultural Economics, Bombay;
- vi) National Council for Applied Economic Research, New Delhi;
- vii) National Productivity Council, New Delhi;
- viii) Administrative Staff College, Hyderabad;
- ix) Indian Institutes of Management located at Ahmedabad, Calcutta and Bangalore;
- x) Shri Ram Centre for Industrial Relations and Human Resources, New Delhi; and
- xi) Institute of Techno-Economic Studies, Madras.

These institutions undertake research on problems relating to agricultural economics on their own and on request by Central or State Governments. Very often financial assistance is extended to them by the Government.

61.19.14 Certain international organisations have also recently shown interest in research in specific agro-economic problems. A global study on the social and economic implications of large scale introduction of new varieties of foodgrains sponsored by the United Nations Development Programme (UNDP) and another study on the impact of tractorisation on employment sponsored by the World Bank were undertaken in selected areas in the country. A study of the impact of improvements in rice farming, sponsored by the International Rice Research Institute in selected regions has also been carried out.

61.19.15 During the last two decades a good deal of research and data collection had been done in the field of agricultural economics by the above mentioned organisations. Even so there remain significant gaps in information and knowledge. There is also much to be desired about the way the work is organised in various institutions. The practice so far has been that whenever information is required, ad-hoc studies, mostly diagnostic, are sanctioned for different centres for limited periods without any attempt at organising them into a coordinated programme of research. Among the few exceptions are the farm management and cost of production studies. An obvious draw-back of this approach has been that very often no uniformity could be ensured in respect of concepts and definitions adopted by different institutions and hence in the information collected. Neither could there be continuity in the flow of information as the projects were temporary. In the case of some schemes, particularly farm management studies, technical staff recruited and trained at considerable cost had to be disbanded which invariably resulted in wastage of trained manpower. It has also to be kept in mind that experienced research workers are not many and finances available for the purpose are rather limited. All these clearly point to the need for placing agro-economic research on a sound footing and for greater coordination of the work of various agencies involved so that information of interest to Government is obtained at short notice, almost on tap.

61.19.16 The first step in such a systematisation and rationalisation is to indicate the priority areas of research in the field of agricultural economics. We note that a

sub-committee set up by the former Scientific Panel on Agricultural Economics, Statistics and Marketing of the ICAR had looked into this question and gave suggestions regarding the priority areas for research. The list drawn up by that committee, however, appears to be too long. Taking into account the immediate needs of agricultural planning, we feel that the priority areas for concentration of future efforts should be as follows:

- i) Problems of small and marginal farmers and agricultural labourers - including evaluation of SFDA and MFAL programmes and assessment of their impact on the weaker sections of society.
- ii) Agricultural labour, employment unemployment and wages.
- iii) Problems of special regions, including those of drought-prone areas, hill areas and tribal areas.
- iv) Analysis of regional disparities in agricultural growth, including a probe into the backward monsoon agriculture of eastern States.
- v) Pattern of income distribution, savings and investment in rural areas, particularly those benefited by intensive agricultural programmes.
- vi) Economics of dry land farming, multiple cropping and improved agricultural practices like fertilisers, new seeds, pesticides, etc.
- vii) Economics of improved water use and water management practices in irrigation projects
- viii) Impact of mechanisation on employment, agricultural productivity and income.
- ix) Economics of livestock, poultry keeping, dairying and fisheries.
- x) Economic aspects of storage and marketing of agricultural produce.
- xi) Changes in consumption pattern and standards of living of different classes in rural areas.
- xii) Cost-benefit analysis of different development projects in the field of agriculture.

xiii) Integrated area development.

xiv) Role and impact of economic incentives for agricultural development.

xv) Capital formation in agriculture.

61.19.17 The next step is to indicate the general pattern of organisational arrangements considered suitable for research and investigation. The type of studies indicated above may be divided into two broad categories, viz., (a) those which need collection of information from micro-level units; and (b) those based on secondary data. While institutions having field level staff like the AER centres, the agricultural economic sections of the agricultural universities and similar specialised agencies can be entrusted with the first type of studies, studies based on secondary data could more appropriately be done at post-graduate centres of research like the Institute of Economic Growth, the Centre for Development Studies, the Institute of Social and Economic Change etc.

61.19.18 It may also be worthwhile exploring the possibility of involving post-graduate students of the agricultural universities in the process of economic investigation, data collection and analysis both for training them and for providing useful data. If organised efficiently and systematically, this type of involvement of students can open up a potential source of agro-economic data at micro level. One way of doing this is to make some investigational work in the field of agricultural economics an integral part of the curriculum prescribed for M.Sc. students in agricultural economics, applied statistics etc. The students could undertake this work during summer vacation either in their own villages if coming from rural areas or in nearby villages if they belong

to urban areas. Studies based on such investigations by their very nature, will be quick and purposive and the cost element comparatively lower. The teaching staff supervising research work of students also stand to gain as these studies would bring them in closer contact with field problems, thus widening their knowledge and experience. Teaching itself would become more realistic and meaningful in the process instead of being merely bookish. The subjects for these studies might be determined by the coordination committee referred to in paragraph 61.19.23 which might indicate in advance to the agricultural universities the items on which information would need to be collected. It would, however, be necessary to provide some financial assistance to students undertaking these investigations for meeting such expenses as on printing of forms, travel, etc.

61.19.19 The work relating to continuous village surveys and farm management investigations, no doubt, constitutes the bulk of research activity in the area of agricultural economics during the post-Independence period and hence demands a closer look. We note with a measure of disappointment that though a large number of single point village surveys and repeat studies have been completed by the AER centres at considerable cost, no serious effort has been made to use them in any systematic analysis of the growth and development process of the Indian economy. The disappointment is all the more because the village studies, focussed as they were on some well-identified forces of change, were primarily intended to throw light on the development process. In spite of this unique aspect about them they have remained largely unexploited.

Broadly, the group of villages studied could be considered as fairly typical of rural India as they were selected not only to represent typical agro-climatic regions but also different stages of agricultural progress. In point of fact, every village could be considered as typifying a particular stage of economic development in the time-path of growth. Viewed from this angle, the 350 and odd villages studied constitute a cross section of the Indian rural economy representing all types of villages, progressive, stagnant, backward and regressive. Based on these enquiries it should be possible to attempt comprehensive studies of the development process seeking mainly to identify the more potent among various forces of change and the more favourable combinations of situations that respond readily to external stimuli and to formulate the course and stages of economic growth and development in the Indian context. Incidentally, such studies would also provide opportunities for comparing the actual trends observed in the rural economy with known formulations of the growth process by theorists. It would be expedient to initiate such studies on an area or State basis at the first stage as studies on an area undertaken by a particular centre have greater uniformity; then on a regional basis based on studies made by more than one Centre and finally at the all-India level.

61.19.20 As this area of agro-economic research has not attracted many researchers it would be necessary to take some promotional steps. We suggest that a few research scholarships or fellowships may be arranged with specialised institutions like the Institute of Economic Growth and Gokhale Institute of Politics and Economics having some links with agro-economic research centres and at the same time providing

facilities for advanced research in humanities, particularly agricultural economics, leading to Ph.D. The ICSSR could also be involved in this programme as they too disburse scholarships and fellowships for work in approved areas of research. The technical personnel belonging to specialised services like the Indian Economic Service and the Indian Statistical Service who are desirous of developing research experience and expertise in agricultural economics, village studies as also farm management investigations offer a challenging area for research. However, essential facilities would need to be created in advance so that the willing could come forward without reservation. We recommend that the cadre authority administering these two Services, in consultation with the Ministry of Agriculture and Irrigation should select eligible and competent candidates, sponsor them to collaborating universities for admission and registration for research and allow them sufficient leave, i.e., 2 to 3 years, to complete the work. Performance of officers involved in this programme and progress of their work could be watched by the Coordination Committee referred to in paragraph 61.19.23.

61.19.21 The farm management studies undertaken so far have provided comprehensive data for 22 typical agro-climatic crop regions in the country. These studies have not only filled many gaps in the data-base but have also proved very helpful in gaining a clear understanding of the structure and functioning of the farm economy. The availability of

reliable and detailed farm level data on a number of basic aspects of the rural economy have facilitated deeper probe by researchers into inter-relationships involving various factors of production which have resulted in some significant contributions to Indian agricultural economics. It is, therefore, very important that those studies are continued and carried further in a phased manner so as to cover all typical agro-climatic regions in the country in course of time. We, however, observe that with the launching of All India cost of production enquiry there is a tendency to play down the importance of farm management studies and slow down its implementation. We would like to emphasise that cost of production studies are no substitute for farm management investigations and the latter should be continued with greater vigour.

Research Coordination

61.19.22 Adequate arrangements did not exist for a long time for coordinating the work of various agencies engaged in agro-economic research. The Research Division in the DES attempted some co-ordination but the effort was confined to schemes sponsored by the Ministry, viz., agro-economic research studies, farm management studies and cost of production enquiries. There was a Coordination Committee for agro-economic research centres, but both in nature and scope, its role was too limited. With the coming into being of agricultural universities, each of which has an agricultural economics section and the institutions referred to in paragraph 61.19.13, the need for coordination of the agro-economic research has increased. The situation had been leading to overlap in efforts in certain areas while major gaps in information continued to persist. The status

of agro-economic research in the country was recently reviewed and it was decided to set up a suitable agency for coordination of agro-economic research.

61.19.23 Accordingly, the existing Coordination Committee for agro-economic research centres was reconstituted into the Coordination Committee for Organisation of Micro-Economic Studies in the field of agricultural economics in May, 1975 under the Chairmanship of Secretary, Department of Agricultural Research and Education. Secretary, Department of Agriculture is a Member. Besides, there are 21 members on the Committee drawn from various divisions of the Ministry of Agriculture and Irrigation, and organisations like the ~~AER~~ centres, IARS, the Programme Evaluation Organisation and the NSSO. Other bodies represented on the Committee are the Reserve Bank of India, the agricultural universities, agricultural colleges, general universities and research institutions. The terms of reference of this Committee are:

- i) to visualise the problems in the field of agricultural economics on which data are needed in the immediate short-run and also in the long run, and to determine priorities for research;
- ii) to examine the broad organisational arrangements necessary for collecting the requisite information, depending upon whether the data need to be collected from the field or the analysis can be based on secondary data already available and to decide upon the institutions that may be entrusted with the studies;
- iii) to determine the subject coverage for the studies that may be taken up every year by the students of the M.Sc. Course in agricultural economics and to indicate in advance to the agricultural universities the items on which information may be collected; and
- iv) to make periodical assessment of the work done and make suggestions for further improvement.

61.19.24 The Coordination Committee will be a standing committee. It has also been decided that the Research Division of DES will service the Coordination Committee in the matter of providing technical and secretariat assistance and taking follow up action on the Committee's recommendation.

61.19.25 We feel that while the setting up of the Coordination Committee has been in the right direction, all important institutions independently engaged in agro-economic research, should be represented on it without making it unduly large. State Bureaus of Economics and Statistics, ^{which} have a regular programme of agro-economic research could also be represented on the Committee. The terms of reference given to the Coordination Committee may be modified to bring under its scope the scholarship scheme suggested in para 61.19.20.

Financing of the projects may be done as before, either by the Ministry of Agriculture and Irrigation if the schemes are to be undertaken by AER centres or by the ICAR in respect of schemes to be undertaken through agricultural universities and other institutions. The ICSSR could also sanction schemes which have a bearing on agricultural economy. There should, however, be a clearcut demarcation of the type of studies which are to be financed by the Ministry, the ICAR and the ICSSR.

61.19.26 The Research Division of the DES would need some strengthening in view of the expansion of work and the additional responsibility it is expected to undertake. The Economic Policy Cell of the DES also needs to be strengthened to enable it to provide the leadership in organising

micro-economic studies and preparing reports of integrated studies relevant for agricultural planning.

20 SUMMARY OF RECOMMENDATIONS

61.20.1 Important recommendations for the improvement of agricultural statistics made in this chapter are indicated below:

1. The coverage of land utilization and crop statistics should be extended to the entire geographical area of the country by 1978-79 at the latest. Ad-hoc estimates of land utilization should be prepared in respect of the non-reporting areas on the basis of aerial photographs, broad topographical survey and other available information.

(Paragraph 61.2.1)

2. The Patwari agency should continue to be responsible for collection of basic agricultural statistics. The jurisdiction of the Patwari should be reduced whenever it is excessive. Intensive supervision through normal revenue and statistical staff should be organised over his work of area enumeration.

(Paragraph 61.2.7)

3. The method of complete enumeration for collection of basic agricultural statistics should be introduced in the States of West Bengal, Orissa and Kerala in a phased manner.

(Paragraph 61.2.8)

4. Refresher training should be imparted to the Patwaris and the Kanungos in the methods of collection of agricultural statistics, at periodic intervals.

(Paragraph 61.2.9)

5. The States should adopt the revised basic and abstract land record forms and concepts and definitions and the procedures for recording of area under mixed crops

recommended by the Committee on Improvement of Agricultural Statistics.

(Paragraphs 61.2.10 and
61.5.10)

6. Crops like soyabean and sunflower which have been introduced in recent years should be included within the scope of crop estimation system.

(Paragraph 61.3.1)

7. The sampling design for crop-cutting surveys should ~~be~~ be reviewed with a view to introducing stratification according to irrigated and rainfed areas and according to high yielding and local varieties of crops.

(Paragraph 61.3.5)

8. The Timely Reporting Scheme, which is in operation in 17 States, should be extended to the remaining States by 1976-77. The Directorate of Economics and Statistics (DES) should try to ensure the quality of the field and supervisory work done in the States under the scheme.

(Paragraphs 61.5.4 and
61.5.5)

9. Each State should review the sowing and harvesting seasons of different crops, at the district level, and revise the period of crop inspection where necessary so that all crops including, late sown summer crops are covered.

(Paragraph 61.5.11)

10. Steps should be taken to reconcile the variations between the different sets of estimates for crops like cotton, tobacco, pepper, cashewnuts, etc. issued by different agencies.

(Paragraph 61.5.12)

11. The DES should prepare qualitative reports on crops and weather conditions on the basis of reports from Block Agricultural Development Officers at the block level and Chief Agricultural Development Officers at the district level, which could be later developed into advance estimates of crop production.

(Paragraph 61.5.13)

12. The scope of the pilot investigations being carried out by the IARS for developing advance estimates of crop production on the basis of biometric measurements of the crop during its growth should be extended to other crops and the results utilised on a field scale as soon as the requisite techniques are evolved.

(Paragraph 61.5.14)

13. The Committee on Improvement of Agricultural Statistics (CIAS) should be activated to consider new proposals for improvement of agricultural statistics and to review from time to time the action taken on its recommendations. The scope of the Committee should be widened to cover livestock, fisheries and forestry statistics also.

(Paragraph 61.5.15)

14. At the present stage of development of remote sensing techniques, their use in crop estimation has certain limitations. The DES should however keep in touch with the developments in the field.

(Paragraph 61.5.17)

15. Situation and outlook reports covering area, production, prices, market arrivals, internal and external trade, stocks etc. should be prepared and issued in respect of principal crops.

(Paragraph 61.5.18)

16. Adequate arrangements should be made in each State ~~for~~ for collection of statistics of area under important fruits and vegetables.

(Paragraph 61.6.4)

17. A census of fruit trees should be conducted once every five years.

(Paragraph 61.6.5)

18. Sample surveys for estimating the yield rates and production of fruits should be conducted for one or two crops every year in rotation in accordance with an all-India programme. For vegetables, pilot investigations should be conducted by the States and IARS in important growing areas.

(Paragraph 61.6.6)

19. To collect the data on prices and arrivals of fruits and vegetables, full time staff should be provided in all the important city fruit markets.

(Paragraph 61.6.7)

20. Methodological investigations should be carried out to standardise the data collection techniques for estimating cost of cultivation of fruits.

(Paragraph 61.6.8)

21. Statistical units should be created in the State Horticulture Departments or agricultural statistics sections to look after the work of horticultural statistics. A separate cell may be created in DES to coordinate the data collected by the States.

(Paragraph 61.6.10)

22. Standard concepts and definitions of terms used in irrigation statistics should be adopted uniformly.

Reconciliation of the figures reported in LUS and Irrigation Progress Reports should be done by the planning unit at the district level.

(Paragraphs 61.7.6 and
61.7.9)

23. Source-wise classification of irrigated area should be amplified to give separate figures for major, medium and minor sources and from surface and ground water sources.

(Paragraph 61.7.10)

24. A Census of irrigation sources should be undertaken along with the Agricultural Census once in five years. Special irrigation surveys on the number of wells and their utilisation may be undertaken by other States.

(Paragraph 61.7.13 and
61.7.14)

25. Annual administration reports of State Irrigation Departments should be published every year together with comprehensive statistical data in standard proformas. These data should be consolidated at all-India level and published annually.

(Paragraph 61.7.17)

26. Statistical units should be provided in the State Irrigation Departments for collection and analysis of irrigation statistics.

(Paragraph 61.7.19)

27. Livestock census should be undertaken simultaneously in all States and Union Territories. While the complete enumeration census may be confined to the broad classification of cattle and other livestock and poultry, details regarding breeds, sex, etc should be obtained through sample surveys.

The practice of having a post-enumeration check by an independent agency should be revived.

(Paragraph 61.8.5)

28. Advance reports on the livestock census results should be brought out within a few months of its completion on the basis of advance tabulations on sampling basis.

(Paragraph 61.8.6)

29. The methodology of integrated surveys for obtaining estimates of output of livestock products and numbers spread over a period of five years should be finalised quickly. Till then, sample surveys for estimation of production of milk and other livestock products should be conducted on a priority basis. A system of periodical release of all-India and State estimates of livestock products should be introduced.

(Paragraph 61.8.10)

30. Weekly wholesale and retail prices of livestock, livestock products, livestock feed and fodder, market arrivals of major livestock products, and monthly production of livestock feed should be collected regularly.

(Paragraph 61.8.11)

31. The Directorate of Marketing and Inspection should carry out fresh surveys to collect upto date information on marketing of major livestock products and proportions of these products converted into various indigenous products such as butter, ghee, cheese, etc.

(Paragraph 61.8.11)

32. Standard proformas for collection of information ~~on~~ of various items in respect of dairy plants, slaughter

houses, bacon factories, poultry dressing plants, feed manufacturing plants, bone digesters, etc. should be prescribed.

(Paragraph 61.8.13)

33. Quarterly district livestock situation reports containing information relating to season, incidence of disease, availability of animal feed and fodder, etc. should be developed.

(Paragraph 61.8.15)

34. The District Animal Husbandry Officer should have the help of requisite computational and other staff, to help him in the collection, compilation and submission of various types of livestock statistics. At the State level, the Director of Animal Husbandry should have a full fledged Statistical Division for collection, compilation, analysis and dissemination of all animal husbandry statistics. This Division should be under the charge of a fairly senior statistician not below the rank of Joint Director of Animal Husbandry. An economist of a suitable rank should also be provided in this Division for economic analysis of various projects and ^{studies} undertaking evaluation statistics.

(Paragraph 61.8.17)

35. The major dairy plants should have an economist on their staff to render advice on economic problems.

(Paragraph 61.8.17)

36. At the Central level, the Statistical unit in the Animal Husbandry Division of the Ministry of Agriculture and Irrigation should be considerably strengthened. An economist should also be provided in this unit.

(Paragraph 61.8.18)

37. The IARS should continue to handle methodological research and pilot investigations in the sphere of livestock statistics. Similar methodological studies should also be taken up by agricultural universities with financial assistance from the Centre.

(Paragraph 61.8.20)

38. An integrated survey should be designed to enable all-India and statewise estimates of marine fish catches to be obtained with a reasonable degree of precision.

(Paragraph 61.9.3)

39. Appropriate methodology for estimation of inland fish production including catches from captive fishery resources should be made available to the State Governments for implementation.

(Paragraph 61.9.4)

40. Data on fishermen population, fishing craft and tackle, inland water resources, biological and research statistics, prices, etc should be collected regularly.

(Paragraph 61.9.5)

41. Census of fishing craft, tackle and nets should be conducted independently of the livestock census by the State Fisheries Departments under the overall technical control and guidance of the Fisheries Division of the Central Ministry of Agriculture and Irrigation.

(Paragraph 61.9.6)

42. Inland fisheries resources should be surveyed periodically, specially with reference to geographical, physical, chemical and biological factors and classified accordingly.

(Paragraph 61.9.7)

43. A continuous survey of marine fisheries resources should be undertaken to collect information on various biological characteristics such as growth, recruitment, mortality etc.

(Paragraph 61.9.8)

44. Registration of small mechanised boats below 25 GRT should be introduced to enable maintenance of upto date statistics of number of such boats in operation as also to keep a watch on the growth of mechanisation of boats.

(Paragraph 61.9.9)

45. In the case of larger vessels above 25 GRT data regarding operational details and performance should be collected and analysed systematically.

(Paragraph 61.9.9 and
61.9.10)

46. State Departments of Fisheries should collect reliable estimates of seed fish on a regular basis.

(Paragraph 61.9.11)

47. Data on producers', wholesale and retail prices for standard varieties and predetermined specifications and other market intelligence in regard to fish should be collected.

(Paragraph 61.9.12)

48. Every State should have a strong statistical unit in the Fisheries Department to deal with all aspects of fisheries statistics. At the Central level, the Fisheries Statistics Unit in the Fisheries Division should be strengthened. An economist should also be added to this

unit at the Central and State levels.

(Paragraph 61.9.17)

49. The Statistical Units in the Central fisheries institutes like the Central Marine Fisheries Research Institute, Central Inland Fisheries Research Institute and Central Institute of Fisheries Technology should be strengthened. For the work of economic evaluation etc., the assistance of an economist should also be provided to these institutes.

(Paragraph 61.9.18)

50. Efforts should be made to reconcile the differences in the two sets of forest area figures available from Land Utilization Statistics and Indian Forest Statistics. The States should adopt modern classification in the collection of forestry statistics according to functional classification.

(Paragraph 61.10.4)

51. Suitable procedures should be devised to frame estimates of unrecorded production through sample surveys or otherwise at least once in five years. The possibility of collecting data on timber and fuelwood from agricultural lands through the periodical agricultural censuses should be examined.

(Paragraph 61.10.7)

52. There is need for verifying the reported figures of output of forest produce in respect of coupes auctioned in standing position, through sample checks.

(Paragraph 61.10.8)

53. The concept of value of outturn of forest produce should be clearly defined and should relate to the value at

the first point of sale by the Forest Departments.

(Paragraph 61.10.8)

54. Wholesale prices of major and minor forest products should be collected regularly at fortnightly or monthly intervals and should be included in the scope of index numbers of wholesale prices.

(Paragraph 61.10.9)

55. Careful analysis of costs of various operations from the stage of plantations to the actual marketing of timber on the basis of economic concepts and usual principles of costing is necessary.

(Paragraph 61.10.10)

56. Regular data on various aspects of labour employed in forestry should be collected according to uniform concepts and definitions.

(Paragraph 61.10.11)

57. A whole-time Forester (Statistics) should be provided in each range for collection and compilation of forestry statistics. At the divisional level, the Divisional Forest Officer should be assisted by a Range Forest Officer (Statistics) and a Junior Statistical Assistant for statistical work. At the circle level, the statistical unit should consist of a Class II Statistical Officer assisted by requisite complement of Statistical Assistants and Clerks. At the State Headquarters, the Chief Conservator of Forests should be assisted by a Director of Forest Statistics. He should be assisted by requisite number of statisticians.

(Paragraphs 61.10.13 and
61.10.14)

58. At the Centre, the existing Statistical Unit in the Central Forestry Commission should be developed into a full-fledged Statistical Division and put incharge of a Statistician in an appropriate scale.

(Paragraph 61.10.14)

59. Data on consumption of fertilisers by crops and by size classes of holdings, etc. should be collected through the Comprehensive Scheme for Cost Cultivation of Crops or through special surveys.

(Paragraph 61.11.1)

60. Data on seed production and distribution and seed rates of different crops/varieties should be collected and compiled regularly.

(Paragraph 61.11.2)

61. Data on quantities of pesticides produced, distributed and applied to different crops should be collected systematically.

(Paragraph 61.11.3)

62. Scope and coverage of foreign market intelligence should be reviewed in consultation with the Ministry of Commerce and adequate arrangements should be made for their systematic collection.

(Paragraph 61.12.5)

63. The Agricultural Census with 1976-77 as the reference period should be carried out as proposed by the Ministry of Agriculture and Irrigation. The results should be made available by the end of 1978 at the latest.

(Paragraph 61.13.2)

64. For meeting the minimum data needs in the sphere of agriculture, an integrated system of agricultural surveys, covering both the current agricultural surveys and the periodical agricultural and livestock ~~censuses~~, should be devised. Various integrated surveys should continue to be carried out by the agencies responsible for the different subjects as at present. There should, however, be adequate arrangements for technical coordination and guidance. The Governing Council of the NSSO should examine this question further.

(Paragraphs 61.14.1 to
61.14.6)

65. The scope of the assessment surveys on High Yielding Varieties Programme being conducted by the IARS should be extended to provide information on the local factors and problems contributing to low or high yields in different regions to serve as the basis for accelerating the pace of agricultural development.

(Paragraph 61.15.3)

66. The work regarding the determination of optimum dosages for fertilisers for different crops in different regions already being done by the IARS should be expanded.

(Paragraph 61.15.7)

67. The IARS should be suitably strengthened to tackle the various research problems, to coordinate and supervise the programmes of statistical surveys and to expand the programmes of training in agricultural statistics.

(Paragraph 61.15.8)

68. Revised series of all-India index numbers of area under crops, net area sown, crop yields, agricultural production

etc. should be issued for all the States. The all-India and State series of these index numbers should be published every year with the minimum possible timelag.

(Paragraph 61.16.3)

69. The new series of index numbers of harvest(Producers) prices as recommended by the Technical Committee on Index Numbers should be initiated as early as possible.

(Paragraph 61.16.4)

70. The compilation of the revised series on index numbers of parity between prices received and prices paid by the farmer should be taken up by all the States.

(Paragraph 61.16.4)

71. Statewise and districtwise studies on growth rates in agriculture should be undertaken at more frequent intervals.

(Paragraph 61.16.6)

72. Technical coefficients for input-output relationships should be worked out on the basis of the data collected during the comprehensive scheme on cost of production of principal crops.

(Paragraph 61.16.7)

73. The scope for use of computers in the collection, compilation and analysis of agricultural statistics needs to be carefully examined. A beginning in this regard should be made by transferring the basic data for past years to magnetic tapes for depth studies, easy and timely retrieval and accuracy of tabulation. If found useful, this could be followed up to cover current data also.

(Paragraph 61.17.1)

74. To reduce the timelag in the availability of agricultural statistics the concerned departments should be provided with printing facilities of their own or a Government printing press should be reserved for the purpose.

(Paragraph 61.17.3)

75. A bibliography of all printed and cyclostyled reports on different aspects of agriculture including those intended for limited official use should be brought out regularly by a Central agency.

(Paragraph 61.17.4)

76. One Statistical Supervisor should be provided in each tehsil to supervise the field work of different ~~censuses~~ censuses and surveys, etc. This supervisor should work under the Tehsildar. To improve the accuracy of tabulation, one hand operated calculating machine should be provided for each tehsil.

(Paragraph 61.18.3)

77. A statistical unit consisting of a District Agricultural Statistics Officer assisted by one Statistical Supervisor/Assistant and one Junior Clerk/Computer should be provided at the district level. He should work under the proposed Chief Agricultural Development Officer at the district level. Two hand operated calculating machines should be provided to this Unit.

(Paragraph 61.18.4)

78. At the State level, the existing organisation for agricultural statistics should be strengthened. The Head of the State agricultural statistics organisation should be a qualified statistician with adequate experience, in an appropriate scale. The Agricultural Statistician should be administratively under the Agricultural Production Commissioner and should be physically located in the same office. He should be assisted by an adequate number of Statisticians, Assistant Statisticians, economists, and lower staff.

(Paragraph 61.18.5)

79. At the Centre, the Agricultural Intelligence Division of the Directorate of Economics and Statistics, the National Sample Survey Organisation and IARS should be suitably strengthened.

(Paragraph 61.18.6 to 61.18.8)

80. Suitable training courses should be developed for periodic training of statistical staff employed in the State and Central Offices.

(Paragraph 61.18.9)

81. For rationalisation of agro-economic research priority areas of research have broadly been spelt out. Institutions having field level staff like the agro-economic research centres etc. can be entrusted with the type of studies which need collection of information from micro level units. Studies based on secondary data

could preferably be arranged at postgraduate centres of research.

(Paragraphs 61.19.16 and
61.19.17)

82 Postgraduate students of the agricultural universities should be involved in the process of economic investigation, data collection and analysis by including investigational work in the field of agricultural economics as an integral part of the curriculum prescribed for M.Sc. students in agricultural economics, applied statistics, etc.

(Paragraph 61.19.18)

83. Research scholarships or fellowships may be arranged at specialised institutions for systematic analysis of the information collected during the village surveys by the agro-economic research centres so as to provide an insight regarding the growth and development process of Indian economy. The cadre authority administering the Indian Economic Service and Indian Statistical Service should, in consultation with the Ministry of Agriculture and Irrigation, select eligible and competent candidates for these fellowships.

(Paragraph 61.19.20)

84 Farm management studies provide a lot of useful information and should be continued.

(Paragraph 61.19.21)

85 All important institutions engaged in agro-economic research should be represented on the Coordination

Committee for organisation of micro-economic studies in the field of agricultural economics.

(Paragraph 61.19.25)

86. The Research Division and the Economic Policy Cell of Directorate of Economics and Statistics should be strengthened.

(Paragraph 61.19.26)



Definition of Land use classification

Classification	Definition of the classification
1. geographical area	The latest figure of geographical area for the State/Union Territory/district based on the Surveyor General of India's data.
2. reporting area for land utilisation purposes	The reporting area stands for the area for which data on land use classification of area are available. In areas where land utilisation figures are based on land records, reporting area is the area according to village papers i.e. the papers prepared by the village accountants. In some cases the village papers are not prepared for forest areas but the magnitude of such areas is known; also there are tracts in many States for which no village papers exist but for which ad-hoc estimates of classification of area etc. are framed to complete the coverage. In such cases, reporting area should give the summation of the area for which village papers actually exist and the area for which ad-hoc estimates are available
3. forests	Area under forests includes all lands classed as forests under any legal enactment dealing with forests or administrated as forests, whether State-owned or private, and whether wooded or maintained as potential forest land. The area where crops are raised in the forest and grazing lands or areas open for grazing within the forests are included under the forest area
4. area not available for cultivation	
area under non-agricultural uses	All lands occupied by buildings, roads and railways or under water, e.g., rivers and canals and other lands put to uses other than agricultural

Classification	Definition of the classification
barren and unculturable land	This covers all barren and unculturable land like mountains, deserts, etc. land which cannot be brought under cultivation unless at a high cost shall be classed as unculturable, whether such land is in isolated blocks or within cultivated holdings
5. other uncultivated land including current fallow	
permanent pastures and other grazing lands	These cover all grazing lands, whether they are permanent pastures and meadows or not; village common grazing lands included under this head
miscellaneous tree-crops and groves not included in the net area sown	Under this class is included all cultivable land which is not included under "net area sown" but is put to some agricultural use; Lands under casurina trees, thatching grass, bamboo bushes and other groves for fuel etc., which are not included under orchards are classed under this category
culturable waste	These include all lands available for cultivation whether not taken up for cultivation or taken up for cultivation once, but not cultivated during the current year and last five years or more in succession; such lands may be either fallow or covered with shrubs and jungles which are not put to any use (they may be assessed or unassessed and may be isolated blocks or within cultivated holdings) land once cultivated but not cultivated for five years in succession is also included in this category at the end of the five years
6. fallow lands fallow land other than current fallows	This refers to all lands which were taken up for cultivation but are temporarily out of cultivation for a period of not less than one year and not more than five years; the

reasons for keeping lands fallow may be either poverty of cultivators or inadequate supply of water or malarial climate or silting of canal and rivers or unremunerative nature of farming.

current fallows

This class comprises cropped areas which are kept fallow during the current year; for example, if any seeding area is not cropped again in the same year it is treated as current fallow

7. net area sown

This represents the area sown with crops and orchards counting areas sown more than once in the same year only once



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APPENDIX 61.2

(Paragraph 61.3.1)

List of Forecast Crops and Year of Initiation of Regular Estimates

<u>Crop</u>	<u>Year of initiation</u>
rice	1885
jowar	1945-46
bajra	1945-46
maize	1945-46
ragi	1947-48
small millets	1951-52
wheat	1884
barley	1947-48
gram	1947-48
tur	1951-52
other kharif	
pulses	1951-52
groundnut	1896
castorseed	1926-27
sesamum	1885
rapeseed & mustard	1885
linseed	1885
nigerseed	1965-66
safflower	1966-67
coconuts	1965-66
cotton	1885
jute	1885
mesta	1952-53
sann-hemp	1958-59
sugarcane	1900
tobacco	1949-50
potato	1949-50
pepper (black)	1951-52
chillies (dry)	1951-52
ginger(dry)	1951-52
arecanut	1966-67
turmeric	1964-65
banana	1966-67
guarseed	1964-65
tapioca	1967-68
cardamom	1969-70
coriander	1969-70



APPENDIX 61.3

(Paragraph 61.3.3)

Size and Shape of the Plot employed in Crop Estimation Surveys

State	Dimensions and the shape of the plot(m)	Size (ha)	Exceptions unless otherwise specified* (dimensions of plots in metres)
(1)	(2)	(3)	(4)
Andhra Pradesh	5 x 5	1/400	for tur, castor, sesamum & cotton plot size is 10 x 10 i.e. 1/100 hectare.
Assam	5 x 5	1/400	-
Bihar	10 x 5	1/200	for tur, jute, mesta, sugarcane & rape & mustard plot size is 5 x 5 i.e. 1/400 hectare.
Gujarat	5 x 5	1/400	for castor and cotton plot size is 10 x 5 i.e. 1/200 hectare..
Haryana	10 x 5	1/200	-
Himachal Pradesh	10 x 2	1/500	-
Jammu & Kashmir	10 x 5	1/200	for potato 5 x 5 i.e. 1/400 hectare.
Kerala	5 x 5	1/400	-
Madhya Pradesh	5 x 5	1/400	for cotton 10m x 11 rows of variable plot of size 1/200 hectare.
Maharashtra	10 x 10	1/100	for rice konkan and ragi the plot size is 10 x 5 i.e. 1/200 hectare and for cotton & tur the plot size is 20 x 10 i.e. 1/50 hectare.

(1)	(2)	(3)	(4)
Meghalaya	5 x 5	1/400	
Karnataka	5 x 5	1/400	for tur, castor & cotton the plot size is 10 x 5 i.e. 1/200 hectare.
Orissa	circle of radius 4'	1/866 acres	for jute 16.5' x 16.5' i.e. 1/160 of an acre.
Punjab	10 x 5	1/200	
Rajasthan	5 x 5	1/400	for cotton plot size is 10 x 5 i.e. 1/200 hectare.
Tamil Nadu	5 x 5	1/400	for cotton, sugarcane and groundnut plot size is 10 x 5 i.e. 1/200 hectare.
Uttar Pradesh	equilateral triangle of size 10	1/230.8	for sugarcane and jute plot size is 5 x 5 (1/400 hectare) & cotton 20 x 10 i.e. 1/50 hectare for sugarcane (factory area) the plot size is 10 x 10 i.e. 1/100 hectare.
West Bengal	Circle of radius 5' 7"	1/435.6 acre	for tur and potato, sugarcane the plot size is 15' x 15' i.e. 1/193.6 acre.
Dadra & N.Haveli	5 x 5	1/400	-
Delhi	5 x 5	1/400	-
Goa	5 x 5	1/400	-
Pondicherry	50 links x 20 links	1/100 acre	-

* The size and shape of the plots given in columns (2) and (3) are generally applied for almost all crops and the exceptions are presented in column (4).

APPENDIX 61.4

(Paragraph 61.3.3)

Percentage of Area Covered by Crop-Cutting
Surveys on different Crops - 1973-74

Crop	Percentage of area covered by crop cutting surveys to the total area under the crop
cereals	
rice	97.1
jowar	99.6
bajra	99.7
maize	93.4
ragi	82.9
small millets	30.9
wheat	98.4
barley	98.9
total cereals	94.7
pulses	
gram	98.1
tur	77.9
other kharif pulses	2.4
other rabi pulses	53.0
total pulses	55.0
total foodgrains	87.5
oilseeds	
groundnut	96.0
castorseed	89.7
sesamum	52.6
rapeseed & mustard	40.1
linseed	51.0
total oil seeds	70.7



254

fibres

cotton

89.6

jute

98.1

mesta

28.8

other crops

sugarcane

94.3

potatoes

44.6

chillies

8.5

tobacco

72.1

tapioca

83.4



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APPENDIX 61.5

(Paragraph 61.4.4)

Method of working out Estimated Foodgrains Production for 1966-67 to 1972-73 on the basis of Estimated Consumption Requirements.

The estimated production of foodgrains for the period 1966-67 to 1972-73 given in Table ^{61.1}~~60.1~~ has been derived by working out the ex-post levels of consumption for these years and making due allowances for actual imports and changes in **stocks**. The estimates of consumption for this period have been derived by taking the availability in 1973-74 as an estimate of consumption for the year and by proceeding backwards after taking into account the composite effects of changes in population per capita incomes at constant prices and deflated prices of foodgrains for these years. Thus, the estimated consumption of foodgrains in each previous year is given by:

$$C_{t-1} = \frac{C_t}{\left(1 + \frac{R}{100}\right)}$$

Where C_t = consumption of foodgrains in the t th year,
 C_{t-1} = Consumption of foodgrains in the $(t-1)$ th year.

$$R = \left\{ \left(1 + \frac{P_o}{100}\right) \left(1 + \frac{Y E_y}{100}\right) \left(1 + \frac{P_p E_p}{100}\right) - 1 \right\} 100$$

Where, P_o = Percent change in population in the t th year over $(t-1)$ th year

Y = Percent change in per capita income at (1960-61) prices in t th year over $(t-1)$ th year

E_y = Income-elasticity of demand for foodgrains.

P_p = Percent changes in the wholesale prices of foodgrains (i.e. in the index numbers of wholesale prices of foodgrains deflated by All Commodity Index) in the t th year over $(t-1)$ th year.

and E_p = Price elasticity of demand for foodgrains.

2. For this purpose, it has been assumed that the population has been growing at the rate of 2.2 percent per annum during 1966 to 1971 and 2.1 per cent per annum during the period thereafter. The annual rates of growth of per capita income at constant (1960-61) prices given in the Economic Survey, 1974-75 have been adopted in this exercise. Further, for purposes of estimating the price effect on real demand, the Economic Adviser's Index Numbers of Wholesale Prices of foodgrains, deflated by All commodities price index has been used.

3. The following table gives the estimates of population, per capita real incomes and deflated Index Numbers of wholesale prices during 1966 to 1974.

	population* (millions)	per capita** NNP at 1960-61 prices (Rs)	index numbers of wholesale prices deflated by all commodities index
1966	493	310.9	118.5
1967	504	308.2	135.5
1968	515	328.4	126.0
1969	527	331.7	120.1
1970	539	343.1	117.0
1971	551	351.8	112.7
1972	562	348.4	118.5
1973	574	337.4	117.3
1974	586	340.1	124.7

Source: * Directorate of Economics & Statistics, Bulletin on Food Statistics, 1973. Pages 4-5.

** Ministry of Finance - Economic survey, 1974-75 page 59. The estimates for 1966 relate to 1965-66 and so on.

4. For purposes of this exercise the values of the income elasticity of demand and price elasticity of demand have been taken to be 0.46 and (-) 0.34 respectively.¹ The estimates of net production and gross production of foodgrains consistent with the estimated levels of consumption on the basis of the above stated assumptions have been derived by making adjustments for imports and changes in stocks and allowing for the use of foodgrains for seed, feed and wastage at the rate of 12½ per cent of gross production.



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1. Year of Publication - Long Term Projections of Demand for and Supply of Selected NCAER Agricultural Commodities, 1960-61 to 1975-76: 80, New Delhi

APPENDIX 61.6

(Paragraph 61.6.6)

Concepts and Definitions for Surveys on Fruits and Vegetables

A Fruits

1. Tree of bearing age:

A tree of bearing age may be regarded as a tree which has attained the age at which 95% of the trees are normally expected to bear fruits. The bearing ages for different fruit crops may be taken as follows:

i) guava, plum, apricot, peach, sapota, lime and other citrus fruits.	4 years
ii) mango and litchi	5 years
iii) grape vine	3 years
iv) papaya	18 months
v) apple	7 years
vi) pear	6 years
vii) walnut	10 years

It may be noted that the bearing ages as given above are only indicative. The States may suitably modify these ages according to the agro-climatic conditions prevailing in the State.

2. Bearing tree:

The bearing tree is regarded as the one which has attained the bearing age as specified under (1) and has also borne fruits during the season/year under survey.

3. Non bearing tree:

A tree of bearing age which fails to bear fruits during the season/year under survey due to any reasons such as disease, old age, withering of flowers etc. is regarded as non-bearing tree.

4. Young tree:

Young tree is the one which has not attained the fruit bearing age as yet.

5. Orchard

A compact piece of land which is atleast $1/10$ th of an hectare area in size or is having at least 12 trees planted on it, may be regarded as an orchard.

It may be clarified that in the case of such fruit trees where distance between the trees is quite large say more than six meters as in the case of mangoes, the orchard will be defined according to the minimum number of 12 trees planted in it while, in such cases where the distance is less than six meters as in the case of bananas, papayas, grape vines etc., the orchard will be defined on the basis of the minimum area of $1/10$ th of an hectare.

6. Stray or scattered trees:

Trees not planted in orchards, those planted in clusters of less than 12 trees, or those in a piece of land less than $1/10$ th of an hectare as well as those planted in back-yard of houses, along the roads, river banks etc. are regarded as stray or scattered trees.

7. Young and bearing orchards:

A young orchard is defined as the one in which at least 90% of the trees planted have not attained the bearing age during the year under survey, other-wise it will be regarded as a bearing orchard.

8. Extent of cultivation of fruits:

Extent of cultivation of fruits includes:

- i) total number of fruit trees categorised as bearing, non-bearing and young,
- ii) number of orchards categorised as bearing and young and
- iii) area under orchards.

9. Area under orchards of a given fruit crop:

In a tract or a region, the sum-total of areas under all orchards in which a minimum number of 12 trees of a given fruit crop are planted or those orchards having area more than $1/10$ th of an hectare will be regarded as area under orchards of a given fruit crop in the tract. It may be remarked that this area will include all such area occupied by vacant spaces in the orchards, mixed crops other than the given fruit crop grown in the orchard, wells, huts and bunds etc.

10. Net area under a given fruit crop:

Net area under a given fruit crop is defined as the area occupied by trees of the given fruit crop alone excluding all such areas occupied by vacant space, wells, huts and area under mixed crops including area occupied by fruit crops other than the given fruit crop planted in the orchards of a given fruit crop. This area could be obtained by estimating the number of fruit trees planted in the region and average area occupied by a single tree as estimated from average spacing between the trees planted systematically in rows and multiplying these two estimates i.e. the estimate of number of trees of a given fruit crop by the estimate of average area occupied by a tree of that crop.

11. Average yield per tree of bearing age:

By average yield per tree of a bearing age is meant the average yield per tree of bearing age as specified in (1) in terms of weight as well as count of fruits.

12. Average yield per bearing tree:

The average yield per bearing tree is the average yield obtained from trees of bearing age which have borne fruit during the season/year under survey in terms of weight as well as count of fruits.

B Vegetables

1. Vegetable

Vegetable is an agricultural product which is used for human consumption and eaten as raw or in cooked form alongwith cereals. We may broadly classify different vegetable crops in the following categories:

- i) fresh vegetables
- ii) root crops
- iii) peas and beans

Note: Onions and green spice crops are excluded from this definition.

The fresh vegetables may be categorised as

- a) leafy vegetables include fenugreek(methi), palak, chulai etc.
- b) gourds including bottle gourd, bitter gourds, squash melon and sponge-gourd etc.
- c) other vegetables such as lady's finger, cabbage, brinjal, tomato, cauliflower, etc.

Root crops may include potato, arvi, zimikand etc.

Beans may include green peas, french beans etc.

2. Vegetable field

A vegetable field is a compact piece of land in which vegetables are grown either as pure or in mixed form or as intercrops. For the purpose of survey the minimum size of such field in plains should be 0.05 hectare and in hilly areas it should be 0.02 hectare.

3. Mixed vegetable field

When in a field, two or more vegetable crops are sown in such way that it is difficult to apportion the area under each crop and also, when percentage of any single crop does not exceed 90% of the total number of plants in the field then, such field will be regarded as under mixed vegetables. Vegetables sown in mixed form are harvested more or less during the same period.

4. Pure vegetable field

A pure vegetable field is the one in which either a single vegetable crop is sown at a time or the percentage of the number of plants of the main vegetable crop is more than 90.

5. Inter-crop/support-crop

Inter or support crop is the one which is sown along with certain other field or horticultural crop in a systematic form e.g., vegetables sown in the vacant spaces in a mango orchard or those sown as support crops in a young orchard. Vegetables which are sown in a mixed form such that when harvesting of one vegetable crop is more or less completed, the harvesting of second crop commences will also be regarded as inter-crops. When sown along with certain field crops, the area will be accounted for vegetables only when the plant ratio of vegetables is at least 25%.

6. Area under a given vegetable crop

The area under a given vegetable crop in a tract is the total of areas of fields sown under that vegetable. The areas under such fields in which the given vegetable is sown in a mixed form will be regarded as inter-crop as if the entire area were under that crop.

7. Area under vegetables

Area under vegetables may be measured as net area or cropped area.

- i) Net area under vegetables is the area under cultivation of vegetables during the given agricultural year excluding area sown more than once.

- ii) Cropped area under vegetables is the total area under all the vegetable fields sown during the year including area sown more than once during the year as well as area under mixed crop counted as many number of times as the number of mixed crops sown in the field. Alternatively cropped area may be defined as total of areas under different vegetable crops grown in the agricultural year.

8. Crop-cutting plot

For the purpose of estimating the production of vegetables, the random plot having a size of 5 x 5 sq. meters will be regarded as a crop-cutting plot. However, for conducting surveys in Hill areas where cultivation of vegetables is done on terraces, the size of such plot may be smaller suiting the conditions of the crop.

9. Sowing date

Sowing date of any vegetable crop will be week and month during which the vegetable seeds are sown in the field or transplantation of seedlings takes place.

10. Period of harvesting

Period of harvesting of any vegetable crop will be regarded as total period between the first picking and the last picking when, either the crop is completely harvested or the vegetable field is ploughed for sowing the next crop.

11. Vegetable season

Different vegetables are sown during different periods. In fact, for some of the vegetables, the total sowing and harvesting period may be less than 80 days. It is rather difficult to define the season for each and every vegetable. Some-time, the harvesting and sowing of vegetables in different fields goes on simultaneously. We may broadly divide the year into three seasons viz., winter season starting from October to February, summer from March to June and rainy from July to October. In order to collect reliable data on the extent of cultivation of vegetables it is necessary to completely survey the selected villages during each of the three seasons. For a given vegetable, its season will be the one in which majority of the crop is harvested.

APPENDIX 61.7

(Paragraphs 61.7.6 & 61.7.10)

Concepts and Definitions of Terms used in Irrigation Statistics

1. Irrigation requirement: The quantity of water, exclusive of precipitation, that is required for crop production. It includes economically unavoidable wastes.
2. Net area sown: This is the total of area sown with crops and orchards counting areas sown more than once in the same agricultural year only once.
3. Total cropped area or gross area sown: This is the sum of areas under all crops and represents the sum of net sown area and area sown more than once in the year.
4. Intensity of cropping: This is the ratio of gross (total) area sown to the net area sown expressed as a percentage.
5. Net irrigated area: This is the total area irrigated, counting area irrigated more than once on the same land in an agricultural year, only once.
6. Gross irrigated area: This is the total of irrigated area under various crops during the year, being the sum of net irrigated area and area irrigated more than once in the same year.
7. Intensity of irrigated cropping: This is the ratio of gross irrigated area to net irrigated area, expressed as a percentage.
8. Crop irrigation ratio: This is the ratio of irrigated area under a crop to the total area under the same crop expressed as a percentage.

9. Gross command area (GCA): The total area (including unculturable area under habitation, roads, tanks, wastelands etc.) covered by a specific irrigation project.
10. Culturable command Area (CCA): This represents the culturable area in the gross command area.
11. Intensity of irrigation: This is the gross irrigated area in an agricultural year expressed as a percentage of the project's culturable command area.
12. Tanks: Pre-Independence storage schemes which were designated as tanks in irrigation statistics. Those which irrigate more than 1600 hectares net should be classified as large tanks and the rest as small tanks.
13. Major Irrigation schemes: All surface water schemes having a CCA of more than 10,000 hectares.
14. Medium Irrigation schemes: All surface water schemes having a CCA of less than 10,000 hectares but more than 1600 hectares come under the purview of medium irrigation schemes.
15. Minor Irrigation Schemes: The classification of irrigation schemes as minor introduced since the beginning of Planning era has been based on different criteria viz. cost criterion during the Five Year Plans and physical criterion for the pre-Plan schemes. The cost criterion has been further subject to the proviso that the scheme should also have an independent water source. Any scheme catering for alterations or extensions in the existing major-medium schemes does not come under the purview of minor irrigation. The criteria adopted for the purpose during different periods are as indicated below:

- i) Pre-Plan period: Pre-plan schemes irrigating individually 1600 hectares or less come under the purview of minor irrigation schemes.
 - ii) Beginning of First Five Year Plan to March 1965
Schemes individually costing less than Rs 10 lakhs come under the purview of minor irrigation schemes.
 - iii) April 1965 to March 1970 Schemes individually costing less than Rs 15 lakhs come under the purview of minor irrigation schemes.
 - iv) With effect from April 1970 Schemes costing individually less than Rs 25 lakhs in the plain areas and less than Rs 30 lakhs in the hill areas come under the purview of minor irrigation.
 - v) now recommended: Schemes having a CCA of 1600 hectares or less.
16. Storage schemes: Storage schemes include tanks and reservoirs which impound water of streams and rivers for irrigation purposes.
17. Diversion Schemes: These schemes aim at providing gravity flow irrigation by mere diversion of stream water supply without arranging any storage. They consist of weir (called 'anicut' in the south, 'bandhara' in Maharashtra and Gujarat and 'thingal' in Manipur) constructed across the stream for raising and diverting water and a canal system to carry the diverted water to the fields. The channel carrying water is also known by various names in different regions. It is called, 'Khul' in the hilly areas, 'pyne' in Chhota Nagpur (Bihar), 'dong' in the Assam region, and 'low khong' in Manipur.

18. Public Surface Water Lift Irrigation Projects:

In regions where the topography does not permit direct flow irrigation from rivers or streams and lakes, water has to be lifted through pumping. Lift irrigation projects comprising pumping plants installed on rivers, streams or lakes and conveyance and distribution systems, executed and operated by Government come under the purview of public lift irrigation projects.

19. Private Surface Water, Lift Irrigation Schemes:

Private pumping installations and distribution system by **individual or group of farmers** on surface water sources fall under the category of private lift irrigation works.

20. Tubewells (including Bore Wells and Filter Points):

Tubewell essentially consists of a deep bore drilled into ground with the purpose of tapping ground water through one or series of permeable layers of water bearing strata. Tubewells drilled in the predominantly hard rock areas, where the bores can stand on their own and where lining by blind pipes is not necessary, are called bore wells. Generally, strainers are not provided in bore wells.

Small diameter shallow tubewells installed in the soft alluvial formations or the coastal regions are called filter points. The artesian/sub-artesian wells in which water rises higher than the water table in the upper strata also come under the purview of the tubewells.

Tubewells operated and maintained by the State Departments, Public Corporations, Cooperative Societies or on community basis come under the purview of Public tubewells and others owned by individual farmers as Private tubewells.

21. Dugwells: As distinguished from tubewells, dugwells comprise open surface wells of varying dimensions, dug or sunk from the ground surface into the water bearing stratum to extract water for irrigation purposes. Usually three types of wells are constructed: (a) masonry wells; (b) wells in rocky sub-strata; and (c) kutcha wells.

